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REPORT

A Strategic Framework and Practical Options for Integrating Flood Risk Management -

to reduce existing flood risk and the effects of climate change

Prepared for the Ministry for the Environment
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MINISTRY FOR THE ENVIRONMENT

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Executive Summary

Purpose and scope

This report scopes options for better coordination and practice between central government, local government and civil society on legislative, regulatory and non-regulatory approaches to reducing existing and future flood risk, including increased risk associated with climate change.

The focus is on reducing the exposure of people and assets to flood risk, rather than on the hazard itself. The report defines the nature of the problem and what has been done since the Flood Risk Review in 2007/8, the issues that still exist in practice and institutional arrangements. The report develops and sets out a range of options to address the current issues. These are then prioritised, and priority options are grouped as a package under the "4Rs" of reduction, readiness, response and recovery. Institutional remedies, coordination mechanisms and funding options are also part of the package.

Background

Flooding is the most frequent and costly natural hazard affecting New Zealand people and communities and is expected to become more frequent and costly with climate change. It is estimated that floods currently cost New Zealand at least $250 million per annum. While flood risk can never be completely avoided, it can be managed to reduce the level of risk.

Many New Zealand communities and rural areas are at risk of flooding due to their location on flood plains and close to rivers and the coast.

The Flood Risk Review in 2007/08 concluded, based on a wide consensus view, that future effort should be primarily directed toward flood risk reduction and that central government could be more active in supporting flood risk reduction, to better balance the current central government investment in response and recovery phases of flood risk management.

Residual risks, from flood events which exceed planned flood mitigation or avoidance measures, are, however, acknowledged and will require emergency responsiveness on an ongoing basis.

Legislation and current practice

There is no one statute that sets out the objectives and functions associated with flood risk management. There are at least 12 statutes with provisions that are relevant. A number of responsibilities are problematic or currently not well-delivered, in some cases because of legislative complexity or gaps.

This report concludes similarly, and in particular, identifies interpretation difficulties (Building Act (BA) and Building Code) and varying practice in navigating and linking the interrelated statutes (Soil Conservation and Rivers Control (SC&RC Act) and Land Drainage Act (LDA) in relation to the Resource Management Act (RMA) and BA.

This report concludes that there are also poor linkages between the planning activity to reduce flood risk and the Civil Defence and Emergency Management (CDEM) activity at readiness, response and recovery stages of flood event management.

Local government agencies have been progressing effectively with planning for emergencies, but the effectiveness of planning to reduce risks through land use planning and related means is patchy. The current level of performance was found to be very mixed, with most councils having taken some steps towards the "ideal" package of regional integration and allocation of responsibilities, flood risk assessment to identify acceptable levels of risk for communities, provisions in plans that seek to avoid risk, and mapping of flood hazard areas and residual risk areas, but none being in the position of having achieved all of these.

Progress since the FRR

Some progress has been made since the completion of the Flood Risk Review. The key areas include; dissemination of information about the government goal of risk reduction for flood

management via CDEM groups, guidance material and training packages, the preparation of a draft NPS, funding for improved radar for rainfall forecasting, a new Rural Assistance package for flood recovery, and increased investment in research and tools for flood risk management.

There are nevertheless still many shortcomings, which if not addressed, will continue people's exposure to flood risk and associated damage costs especially with likely climate change impacts.

There are opportunities to better integrate the decision-making made by the different central and local government agencies, by more explicitly focusing on flood risk reduction, and in situations where this is not practicable, on risk reduction at the pre-event and readiness stages and at the response and recovery stages of a flood event.

Role of Planning

Some of the most cost-effective ways of addressing future hazards almost certainly lie in the area of future planning for land uses, buildings and infrastructure, including retrospective consideration of existing communities and adaptation opportunities. However, for that to work effectively, there are a number of issues that need to be addressed.

- National guidance and leadership currently is inadequate and is greatly needed.
- There is frequently poorly expressed or inadequate policy and plans at regional level.
- In some areas there is inadequate information, or information which is not accessible
- The time context for planning is not specified anywhere and there is considerable confusion about how far into the future flood risk reduction provisions should apply.
- Inadequacy of information is sometimes presented as a valid basis to "do nothing". A "do-nothing" approach will exacerbate risk.
- There appears to be little innovation in the development of techniques for flood risk reduction through planning methods such as physical retrofitting of existing buildings and infrastructure methods to reduce flood risk exposure, retreat areas, maintenance of access above flood levels and flood refuge areas and the acquisition of land for such purposes.
- There appears to be little transfer of information from flood events into the planning process, for example via plan reviews following a flood event.
- The BA and Building Code contain conflicting clauses about building in flood prone areas which constrain local government in exercising their flood risk reduction responsibilities.
- There are shortcomings in the Local Government Act (LGA) around how councils report their expenditure on flood risk reduction making it difficult to see what is being spent and to assess adequacy of investment.
- The SC&RC Act and the LDA are now dated. They don't envisage a wide range of flood risk reduction activities, and don't integrate well with other flood-related legislation.
- There are still some areas in New Zealand where there is an affordability issue with respect to undertaking flood risk assessments and implementing risk reduction activities.
- There are practice issues that require innovation and dissemination of effective flood reduction methods.

Options 1 to 20, listed at the end of this executive summary, address these issues.

Readiness and Response

The overall Goal of the CDEM Strategy which drives operational disaster response is to reduce risks from hazards to New Zealand. However, the guidance material for doing this by linking with the planning system is not developed.

There are therefore opportunities to add a link between the National CDEM Guide on risk reduction and tasking local CDEM groups to identify and encourage implementation of risk reduction actions prior to or immediately after flood emergencies. There is also an opportunity to provide risk reduction information to communities at the response stage so they can take action on their own properties.

Options 21 and 22 at the end of this executive summary address readiness and response.

Recovery

There are opportunities during the recovery stage to reduce flood risk in areas where flood events will return. The goal in the National CDEM Strategy to get people back into their houses as quickly as possible, can be in tension with the opportunity to make improvements to buildings, properties and assets that make them more flood proof or to manage a retreat from hazards.

The Building Act and the Adverse Events Rural Assistance Programme allow rebuilding of like with like after a flood event. This can also remove an opportunity at recovery stage to reduce future damage from floods. There is also a general paucity of information available to demonstrate how effectively pre-planning can reduce flood risk.

Options 23 to 26, in the table at the end of this executive summary, are suggested to address these shortcomings.

A possible new role for the Earthquake Commission

There are shortcomings in the way EQC operates (identified in a paper by Middleton NZEQC, 2008) that reduce the opportunity at the recovery stage for flood risk reduction and indeed to achieve the goal of restoring normality in communities as quickly as possible.

1. Clarification of reoccupation processes after a dwelling has been certified as un-occupiable under the Building Act (currently it is the householder's responsibility to organise certification by a suitable expert), and clarification of minimum acceptable requirements for reoccupation.
2. Addressing shortcomings inherent in insurance as a recovery tool, and the situation of uninsured people.
3. Facilitating the carrying out of temporary or urgent repairs that enable reoccupation of damaged dwellings (currently outside the scope of any agency's responsibilities).
4. A review of the Earthquake Commission Act 1993 and a broadening of its scope to include all causes (including flooding), but to support only those whose homes have been rendered "unsafe or unsanitary" (to key into local authority responsibilities already defined in the Building Act).
5. This new scheme to be aimed at practical and financial aspects of recovery under the auspices of a revamped, renamed EQC (Natural Disaster Commission).
6. Assigning a role to an agency to resource urgent residential habitability assessment (i.e. whether a house is still safe and sanitary after a disaster) and temporary repairs, with a clear specification of this role and its boundaries.

Options 27 to 29 in the table at the end of this executive summary, address these possibilities.

Private insurance

Private insurers in some cases have pulled out of covering flood risk where there are repeat events. Also private insurance does not cover the replacement of improvements that could help reduce flood damage in future (flood proofing and retrofitting) or removal of buildings that could avoid the risk altogether in future.

There are a number of ways that could incentivise such cover for property owners such as more robust planning controls by local councils, e.g. if a building is damaged more than say 50% of its value, the council will not consent its replacement. This driver could incentivise insurers to cover flood proofing improvements and retreat.

Government could take a more proactive role in working with the insurance industry to raise awareness of the opportunities for them to create new products that better reflect the risk.

Option 30 at the end of this executive summary would enable these changes.

Feedback loops into the planning system

At present the links between the emergency readiness, response and recovery stages, and planning action by local government are not clearly set out for action at the time of an emergency. There are a number of ways the planning system could be flagged during the recovery stage of flood emergencies.

The options would provide the necessary feedback to support the earlier options covering RMA amendments, NPS enhancements and guidance on best practice planning methods of flood risk reduction. By providing a feedback to the planning system the "4Rs" could operate more seamlessly and enhance interagency integration.

Options to address these issues and improve the integration of the "4Rs" at the recovery stage are set out in Options 31 and 32 at the end of this executive summary.

Institutional issues

Currently, there a large number of organisations with responsibilities for flood risk management, operating with quite specific mandates under different statutes. Some have several mandates in different statutes which are not all aligned.

The integrity and effective working of the flood risk management system in New Zealand relies heavily on good communications between agencies, good information on flood risk, and on exchange of information within communities during and between flood events. On top of this comes the requirement to consider the greater flood risk exposure due to climate change and thus to plan for the longer term.

The system is skewed towards response to large events, especially from central government. While local government has most of the legislation and tools available to it to undertake flood risk reduction across the full spectrum of structural and non-structural planning tools to reduce flood risk, the latter are not as well developed and applied in practice as they could be. While other options address this issue there are opportunities for institutional design to be addressed to improve integration of flood risk management and to provide stronger central government leadership for flood risk reduction.

Options to address these shortcomings are set out in Options 33 to 37 at the end of this executive summary.

Hazards information

Two purposes for flood hazard information have been identified: information for managing the flood hazards and information to monitor the effectiveness of the flood risk management actions or policy.

The Flood Risk Review identified the fact that hazards information was being supported to varying degrees of integrity by a large number of individual local government units. It found there were no standards being applied nationally and there were varying degrees of accessibility of the information. In addition, there were resourcing issues. The larger better resourced local government agencies had more resources to apply to the problem than less well resourced agencies. Consequently, there is a patchy application of flood risk assessments across New Zealand, and thus flood risk is higher than it otherwise could be.

Three options to improve hazards information (in addition to Option 3) are set out as Options 38 to 40 in the table at the end of this executive summary.

Collaboration mechanisms

There are a range of options available for getting better multi-agency collaboration on flood risk management. These include agreements between agencies, preparation of a flood risk management strategy to underpin collaboration (building on work already done and the preferred package of options in this report) and the use of existing coordination mechanisms.

These are set out as Options 41 to 44 in the table at the end of this executive summary.

Recommended package

All the options were consolidated and evaluated in terms of their likely effectiveness, benefits, costs, distribution of benefits, synergies with other outcomes and time to implement. This analysis enabled a judgement to be made as to the priority of each option.

A priority ranking has been given each option on the following basis:

- *Priority 1* high effectiveness, low cost and easy to implement
- *Priority 2* effective and low cost but more complex to implement in terms of timeframe and the process required to implement the option
- *Priority 3* not as effective, more costly and complex to implement.

Priority 1 and 2 are recommended as part of the package.

The preferred approach to provide better integration and collaboration across flood risk management agencies, and better overall performance in flood risk reduction, would require alignment changes and consolidation across hazard management legislation, greater national direction through a NPS, and stronger leadership and capability in the responsible central government agencies, including potential change to institutional arrangements, to support flood risk management, and practice guidance. This means that several options in a package are required. The recommended package includes the items below.

Planning for flood risk reduction

- An NPS precautionary principle; information assessment; local government repository of information; and target date for hazard assessment [1]
- RMAct amendments - define effects of climate change to include flood risk; review existing use rights (TLAs) [1]
- Building Act amendments- S3 and 4 resistant and resilient buildings; improvements to S72 [1]
- Building Code amendments for flood risk and flood resilient buildings [2]
- SC&RCAct/LDA and LGA amendments- FRR purpose; consistent LTCCP reporting (Schedule 10) [1]
- Merge SC&RCAct (with amendments) with LGA [2]
- Consolidate all natural hazards related legislation into a new Act [2]
- Guidance and practice notes; monitoring of effectiveness of practice; pilot projects [1]
- Local government forum [1]
- MfE monitoring framework [1]
- Flood events drive plan reviews [1]

Readiness and response

- CDEM guide revision - add reduction section and task CDEM groups to identify opportunities for planning to avoid future risk [1]
- Information on flood risk reduction to communities [1]

Recovery

- Best practice advice on pre-planning, relocation, flood-proofing [1]
- Building Act consents (like-with-like) [1]
- Adverse Events Rural Assistance policy alignment (like-with-like) [1]
- Pilot projects for integrating planning and flood proofing and retreat [1]
- EQC cover change to total loss all hazards [2]
- EQC role change to community coordination [2]
- EQC to cover betterment [2]
- Private insurance cover for betterment [2]
- Amend CDEM Plan and Guide to enable flood events to drive plan review (CDEM groups) [1]

Institutional arrangements and coordination mechanisms

- MfE stronger capability and leadership of flood risk reduction with resourcing [1]
- Strengthen another government agency [2]
- Merge MfE and MCDEM hazard management functions and create a new agency [2]
- EQC change mandate to cover habitability and all hazards, and coordination of disaster recovery role and undertaking of inspections and repairs[2]
- National natural hazard data repository at central government agency complementary to LTCCP information produced to consistent format [1]
- Cross government strategy on flood risk reduction (pull together the Flood Risk Review conclusions as a strategy and with this preferred package) [1]

- Use DESC and the NZ Geospatial Office coordinating mechanisms to support strategy [1]
- Local government forum [1]

Funding

- Financial support for communities with affordability issues (possibly 2 councils) [2]
- Seed funding of pilot projects to demonstrate flood proofing and retreat practice [1]

The effect of the package recommended would be to strengthen the ability of a central government agency (i.e., MfE, MCDEM as a Natural Hazards and Disaster Management Agency or establish a new agency) to provide the national leadership for flood risk management. With the preferred options for planning, readiness, response and recovery they combine to provide more effective flood risk reduction delivery. The bringing together of a flood risk reduction strategy based on the Flood Risk Review findings and this preferred package of options as an Action Plan would underpin the improvement of collaboration and integration of flood risk management across New Zealand, thus reducing flood risk over time to communities.

Summary of Options	
Planning Related Options	
Option 1	The National Policy Statement on Flood Risk Management (NPS) to state that regional and district plans should take a precautionary approach in the absence of reliable information on flood hazard.
Option 2	The to state that • inadequacy of information is not a reason for not planning to avoid or reduce flood hazard. • local authorities should use the best available information to identify areas at risk • local authorities should continue to improve their information over time • planning should take into account the effects of climate change and other changes that could modify flood risk, including expected “upstream” landuse changes that are anticipated and/or planned for • local authorities should apply the NZ Flood Standard and its risk based approach in planning and decisions.
Option 3	The NPS to require local authorities (regional and district) to develop and maintain a publicly-available repository of information, on past and predicted flood information, including for predictions, information taken into account and assumptions made, and a commentary on reliability, in terms of section 35(i) with or without a timetable. (See also Option 38, a national repository of information and monitoring.)
Option 4	Add a new item to section 7 RMA to require specific consideration of flood hazard or flood risk exposure.
Option 5	Clarify the meaning of the effects of climate change in sections 2 and 3 RMA to encompass increased flood risk.
Option 6	Use the RMA instrument of a national environmental standard as a basis for planning (e.g., achieve a nationwide risk exposure from flooding of less than a specified annual exceedence probability – eg, 1% max).
Option 7	Use the RMA instrument of a NPS to provide a good level of direction to councils in terms of flood management by way of a planning timeframe and a risk based target (see also Options 1, 2 and 3).
Option 8	Provide territorial authorities with powers to cancel existing use rights (analogous to those provided for regional councils) where flood hazard is an issue. This would involve exceptions in terms of RMA sections 9, 10 and 10B.
Option 9	Add a provision to sections 3 or 4 of the BA which specifically refers to buildings being resistant or resilient to natural hazards (including the range of sources of flood risk).
Option 10	Reword section 72 of the BA as an option rather than a compulsion, ie, provide councils with more power to decline building consents in hazard-prone areas.
Option 11	Consider and progress the introduction of a flood risk code, which would promote flood resilient buildings (flood proof materials, design, access to buildings) and apply to all work for which a building consent is required, including post-event works.

Option 12	Consolidate the relevant parts of the LDA, SC&RC Act, the Environment Act into a Natural Hazards Risk Reduction (including floods) statute that incorporates a comprehensive definition of flood risk management activities (non-structural and structural). (See Option 35.)
Option 13	Incorporate a clear flood risk reduction purpose within the LDA and the SC & RC Act, and add power under the SC & RC Act to undertake non-structural flood risk reduction action.
Option 14	Merge the roles and responsibilities currently under the LDA and the SC & RC Act and amended to define flood risk management activities to include non-structural approaches, within the LGA (and a consequential amendment to the Local Government (Rating) Act 2002).
Option 15	Require separate and standardised LTCCP reporting on financial provisions for flood risk reduction planning, asset management, and other provisions. (This could be achieved by clarification in the LGA 10th Schedule.)
Option 16	Provide financial support for planning for under-resourced communities which is based on ability to pay (council income based approach) and consider further the Crown contributing as a landowner beneficiary of services that reduce flood risk.
Option 17	The NPS should include more emphasis on including the following points: local authorities should undertake pre-planning, and should have objectives, policies and where practicable, rules to ensure that opportunities are taken up at recovery stage to reduce risk (i.e., retrofitting for reduced flood exposure).
Option 18	MfE to develop and promote a series of best practice guidance notes, or other actions, to encourage innovation and dissemination of best practice in planning activities for flood risk reduction.
Option 19	MfE/Ministry of CDEM to lead a local government forum to encourage best practice in active management and planning ahead for flood risk reduction.
Option 20	MfE to develop and apply a framework for monitoring the effectiveness of planning actions, and planning responsiveness to flood events.
Readiness and Response Options	
Option 21	Add an additional section to the National CDEM Guide on Reduction actions that could be initiated at the Readiness and Response stages of flood emergencies, including tasking local CDEM groups to identify and encourage implementation of risk reduction opportunities prior to and/or immediately following a flood emergency.
Option 22	Provide public information on opportunities to reduce flood risk to communities at the Response stage.
Recovery Related Options	
Option 23	Central Government through MfE and Ministry of CDEM to jointly develop and promulgate “best practice” advice for local government to pre-plan for retreat, relocation or other methods, for building owners to flood-proof buildings, and to encourage CDEM groups to have a pro-active role in such action.
Option 24	Central Government to fund one or more pilot projects in pre-planning to improve physical aspects of local flood resilience, in partnership with local governments, civil society and insurance agencies.
Option 25	Amend section 112 of the BA to encompass flood risk reduction, and the First Schedule to the BA to exclude any ability for buildings/structures damaged by flooding to be reinstated without consent (unless such repairs are minor, do not exacerbate flood risk and comply with provisions developed and agreed as part of a local pre-planning exercise which the territorial local authority has been party to).
Option 26	Amend the Adverse Events Rural Assistance policy to include an extra check that is made to avoid replacing “like with like” structures or buildings where it may exacerbate on site or downstream risk of flood hazard.
A New Roles for the EQC	
Option 27	Broaden the scope of EQC to include all causes (including flooding), but to support only those whose homes have been rendered “unsafe or unsanitary”.

Option 28	Change the role of EQC to enable it to carry out urgent inspections and repairs so people can get back into their houses quickly and to enable it to manage the recovery process for those evacuated for longer time periods and thus facilitate community recovery in a proactive way.
Option 29	Enable the EQC to cover flood proofing improvements and re-siting of some affected buildings.
Private Insurance	
Option 30	Explore the development of a government/insurance industry agreement to raise the awareness of insurance companies to the opportunities with central and local government, to create new products that better reflect the flood risk and that cover retrofitting flood proofing actions and re-siting of buildings after a flood event.
Feedback into Planning	
Option 31	The NPS should require plan reviews following flood events within a specified time. If councils decide not to initiate plan changes they could be required to report on their reasons to MfE.
Option 32	Amend the national CDEM Plan and Guide to task CDEM groups specifically to identify opportunities for plan changes when recovery is underway and forward these to the responsible council for action
Institutional Options	
Option 33	Strengthen the capability of MfE to lead flood risk management as part of its hazards management role.
Option 34	Strengthen the capability of another agency (e.g. MCDEM) to undertake the central government role in hazard risk management (including floods) and amend the responsible agency in existing legislation.
Option 35	Set up a new agency by merging MfE hazard risk management functions with the emergency management role at the MCDEM, including flooding and related climate change adaptation (this could include or not the next option in the one organisation) called the Natural Hazards and Disaster Management Agency (see also Option 12, a consolidated Natural Hazards statute).
Option 36	Change the mandate of EQC as in Options 27, 28 and 29 by amending the EQC Act and retain it as a separate agency or merge with Option 35.
Option 37	Administer NPS and NES for flood risk management from within an EPA.
Hazards Information	
Option 38	Set up a national natural hazards data and information repository at MfE or other central government agency and set a framework and standards for data collection, storage, maintenance and accessibility (possibly through the Geospatial Strategy) and monitor hazard risk reduction and the implementation of the policy and actions (the information repository would be in addition to Option 3).
Option 39	A requirement in the LGAct for LTCCP information to be provided in a consistent manner across all councils (this is complementary to Option 14 but broader, in that it would apply to all local government activity types).
Option 40	Require councils to prepare hazard assessments within a specified timeframe within the NPS.
Option 41	MOU between agencies to collaborate on flood risk reduction.
Option 42	Shared objectives in SOI's on flood risk management responsibilities.
Option 43	Prepare a cross government strategy on flood risk reduction based on the findings of the Flood Risk Review and include the preferred package of options from this report as the Action Plan.
Option 44	Ensure that the flood risk reduction strategy and actions are supported by the activities of DESC and the NZ Geospatial Office coordinating mechanisms.

1 Introduction

1.1 Purpose and scope

This report scopes options for better coordination and practice between central government, local government and civil society on legislative, regulatory and non-regulatory approaches to reducing existing and future flood risk, including increased risk associated with climate change.

The focus is on reducing the exposure of people and assets to flood risk, rather than on the hazard itself. Practical approaches that can be easily implemented and give the best opportunity for reducing flood risk in terms of the associated costs and benefits are identified and prioritised.

The report defines the nature of the problem, sets out what has been done since the Government's Flood Risk Management Review, the outcomes sought, the nature of the hazards, what is exposed and where, current practice and the issues this raises. It then sets out a range of options for initiatives, followed by details, priorities, and a package of options for better integrating practice and improved performance that reduces flood risk overall.

The balance between the approaches is towards the practice end, supported by legislation, regulatory and institutional change where they are necessary to cement integration, collaboration or to clarify or to align purpose.

1.2 Background

Flooding is a natural process, and becomes a hazard only where people or human assets are put at risk. Flooding is the most frequent and costly natural hazard affecting New Zealand people and communities[1] Recent estimates[2] put the cost at approximately $253 million per year, averaged over the last eleven years. Flood events are expected to become more frequent and costly with climate change[3]. While flood risk can never be completely avoided, it can be managed to reduce the level of risk.

The Flood Risk Management Review, completed in 2007[4], concluded that while the current flood risk management framework is not fundamentally flawed, there are important issues that need to be addressed to improve the practice of central and local government, especially in light of increased flood risk from climate change impacts.

It also concluded that central government could be more active in supporting flood risk reduction, to better balance the current central government investment in response and recovery phases of flood risk management. Leadership, through a goal, information, guidance assistance and resources were seen by the review as needed to help local government manage flood risk more effectively and better prepare for impacts of the inevitable climate change effects.

Response agencies and civil society (voluntary and/or non-statutory community-based agencies) have important roles during and after a flood emergency, as set out in the Guide to the National Civil Defence and Emergency Management Plan (Guide to National CDEM Plan). If supported with further information, they could have a significant role in informing the community about how to reduce flood risk in subsequent flood events.

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[1] National Hazardscape Report 2007 Officials Committee for DESC

[2] Research for MfE in relation to the draft National Policy Statement on Flood Risk Management, including costs to central, local and regional government, the Earthquake Commission and insurance companies, but not including uninsured individual costs and costs of disruption, MfE 2008 (unpublished).

[3] IPCC 4th Assessment Report 2007

[4] Comprehensive findings are set out in "Meeting the Challenges of Future Flooding in New Zealand", Ministry for the Environment and The Flood Risk Management and River Control Review Steering Group, Ministry for the Environment, NZ Government, August 2008.

1.3 The nature of flood risk in New Zealand

Many New Zealand communities and rural areas are at risk of flooding. Historic reasons for the establishment of settlements often led to locations in flood plains and close to rivers and the coast. The most productive farm land, and thus the most intensive rural population and asset development are also on flood plains.

Flooding includes:

- High and peak flows in rivers and streams. Where development has taken place on floodplains there is a risk that the processes that have formed the floodplains may occur again. Such flooding includes overtopping of rivers and streams beyond their channels, resulting in fast-flowing floodpaths and lower-energy ponding areas.
- Natural processes in estuaries. Combinations of tides and river flows, and sediment deposition over time, means that areas in and near to estuaries are subject to dynamic changes that can include flood risk.
- Coastal flooding processes including king tides and storm surges, and combinations of events[5].
- Overland flow, where circumstances combine to cause extra-channel flow outside floodplains. Such flooding usually occurs on hillsides, and may arise from debris blocking channels, or extreme rainfall intensities.
- Stormwater surface flooding, where water cannot escape, or cannot escape fast enough, from areas of subdued topography and/or intensive development.

Over decades, many communities have taken steps to address flood risk by land drainage, river diversions, stop-banking and coastal protection works. These mechanisms are expensive to install, require maintenance, and inevitably will be overcome by extreme events beyond the design capacity of the structures. Some have associated adverse effects such as transferring risk to other areas, or retaining flood water in case of a breach.

Existing risks can be exacerbated by:

- changes in catchments upstream
- intensification of development (site coverage, hard surfaces, increasing population)
- changes in access affecting emergency response
- unintended consequences from the location or design of past building or engineering works, e.g., effects of road and rail structures at Matata compounded the effects on poorly-located residential buildings
- reduced community resilience due to a false sense of security being established by structural works, along with social and economic changes in recent years which mean that communities may not be as able to fend for themselves as they were in the past.

The impacts of climate change are likely to increase flood risk in many places, both from more intense rainfall at greater frequency, and from sea level rise and other effects such as more storm surges. Pressures for development in flood plains and coastal areas contribute to greater exposure to these risks.

Current trends in urban planning and transport management seek to contain urban spread and to intensify existing developed areas, potentially exacerbating existing flood risks due to more intensive physical development and a larger exposed population. There is also a trend to encourage the development of mixed use areas, where residential and business activities are closely integrated.

Where urban land is scarce, there is pressure to expand into potentially flood prone areas. This applies to new and expanding residential areas, but also to new industrial and commercial developments, particularly where large land holdings are demanded (notably big-box retailing, new shopping centres, industrial and distribution areas).

[5] Tsunami are extreme and low probability events, which may also require consideration in some locations, but are beyond the brief of this report.

While flooding of residential areas can cause direct individual effects and personal hardship, flooding of rural, commercial and industrial areas affects businesses and employment. Community facilities are major contributors to community resilience during a flood event and justify particular consideration for locating out of harm's way or above flood levels, so they can be used in an emergency flood situation. Flooding of industrial areas and utility services can pose out-of-the-ordinary health, safety and environmental risks. The integration of work and business places in mixed use areas raises further issues, potentially relevant to flood risk[6].

In the rural context, there has been a trend to intensify landuse activity in floodplains and thus to increase the assets at risk e.g. intensive dairying and viticulture. In hill country at risk from overland flow and associated soil erosion, rural economic activity is especially vulnerable and at risk from repeat events, in the context of reduced earnings from sheep and beef farming in particular.

Because of New Zealand's geographic diversity, diversity of communities, and the nature of flood exposure in different parts of the country, a complex set of management provisions has evolved.

Flood risk management has long been seen as an issue which requires community-based, essentially local, decisions and responses[7], but where there are significant stakeholders at national and regional level, and in public and private sectors.

1.4 Flood risk context

To be effective in a New Zealand context, flood risk management must take into account a range of existing circumstances, as well as future expectations of greater risk due to climate change.

The range of existing circumstances can be summarised as:

- established flood-prone communities which are too large and valuable to relocate (Lower Hutt, Christchurch), and which are intensifying or expanding;
- established flood-prone communities which are largely static, but where relocation costs/community disruption effects would be very high (Opotiki, Westport);
- established flood-prone communities which are of a scale and location which may need to be/should be relocated (Waitotara, Kaeo);
- coastal communities where managed retreat may be necessary (Haumoana, Wainui);
- rural areas with populations on floodplains, in floodpaths, and dispersed population and development in hill country;
- national, regional and local infrastructure which may have high exposure to flood hazards, including transport, water supply, sewerage, energy and other utilities

And, accepting that many communities may remain partly or wholly exposed for the foreseeable future, any strategic framework must provide for consideration of the source of flooding, flood paths and the affected land use activities. It will also need to provide for;

- flood prediction
- flood event management
- flood event recovery
- planning for mitigation and avoidance of future flooding of existing development (as far as practicable) and all new development
- recognition of the different risks and hazards associated with residential, commercial, industrial and rural areas.

This report outlines the current practice of flood risk management and suggests ways of reducing flood risk at the planning stage, and at the event readiness, response and recovery stages involving all levels of government and the private and voluntary sectors.

[6] Mixed use developments bring the benefits of having able-bodied people working in close proximity to areas that otherwise may be solely residential. Such people are at hand to assist nearby residents (particularly where the very old and very young are congregated) in cases of emergency. However, mixed uses can also include hazardous facilities and the storage of hazardous substances, posing particular issues at times of emergencies, including flooding.

[7] Most recently expressed in NZ Standard "Managing Flood Risk – A Process Standard", NZS 9401:2008.

The investigations and analysis carried out as part of the Flood Risk Review have indicated a wide consensus view that future effort should be primarily directed toward flood risk reduction. Reduction in this context involves many actions by many parties. While completely avoiding exposure of communities and individuals to flood risk is the ideal, risk reduction can also be achieved through actions that may be partially effective, such as retrofitting existing buildings to avoid or reduce future flood damage. Managed progressive retreat of development from the most exposed areas also leads to effective reduction of risk. When events occur, the adverse effects of flooding can be reduced by effective community responses, and by pre-planning so that opportunities are taken up to reduce community exposure the next time a flood occurs. Residual risks, from flood events which exceed planned flood mitigation or avoidance measures, are, however, acknowledged and will require emergency responsiveness on an ongoing basis.

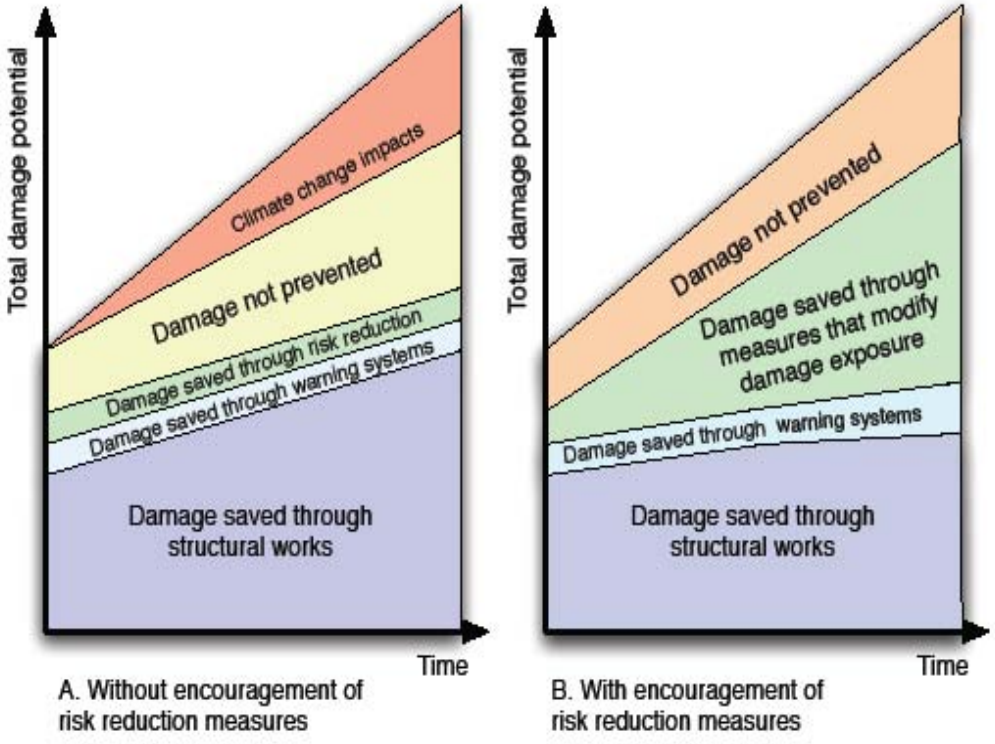

Figure 1 : Conceptual framework for flood damage exposure

Figure 1, after Bewick 1987 and as adapted for climate change by PSConsulting Ltd and David Hamilton and Associates Ltd 2007, shows conceptually the effectiveness of risk reduction measures over a “business as usual” scenario, and the implications of climate change.

2 Legislation and current practice

2.1 Legislative framework

While the Flood Risk Review largely accepted the complexity of the current legislative mandates, and found that practice at regional and district level was the most appropriate focus for improved delivery, it also highlighted a number of responsibilities which are problematic or currently not well-delivered, in some cases because of legislative complexity or gaps. This section briefly reviews the current legislative framework.

There is no one statute that sets out the objectives and functions associated with flood risk management. There are at least 12 statutes with provisions that are relevant[8].

The Environment Act 1986 provides for advisory functions of the Ministry for the Environment (MfE). These include at Section 31 c (iv) the provision of advice to the Government, its agencies, and other public authorities on the identification and likelihood of natural hazards and the reduction of the effects of natural hazards for the purpose of achieving the objects of the Act which includes; (iv) the sustainability of natural and physical resources and (v) the needs of future generations.

In addition, the Minister for the Environment, and hence the Ministry, are the administering agents for the Soil Conservation and Rivers' Control Act 1941 which imposes duties on regional government and territorial local authorities to prevent damage by floods and promote the utilisation of lands in such a manner as will tend towards the attainment of this object (and others related to erosion and soil conservation).

These provisions combined, empower the MfE to take policy and advisory leadership on natural hazards and in particular flood risk reduction. However, the tools available to do this are either advisory only, or related specifically to the physical prevention of water flow by structural means.

Within the broad context of hazards management, flooding is one of the matters which is central to another area of legislation and action. Under the Civil Defence and Emergency Management Act 2002, (the CDEM Act) the administering department at any time is determined by the Prime Minister (section 4)[9], and the Director of CDEM is appointed by the CEO of the responsible department. The Director has a relatively autonomous role which is advisory (only) to the responsible Minister at the time, but highly integrated with the structure which he or she directs in terms of section 8 of this Act. A prime relationship is with local authorities in terms of the purpose in section 3, where reduction, readiness, response and recovery are all aspects on which the Director can require local authority action and co-ordination.

Sections 31 and 39 of the CDEM Act require both a national strategy and a national plan to be prepared.

The current Strategy (2007) has four goals which include:

- increasing community awareness and involvement in CDEM
- risk reduction
- enhancing capabilities to manage emergencies
- enhancing the ability to recover from emergencies.

Under goal 2, risk reduction, research and understanding of hazards is promoted, with all CDEM stakeholders being encouraged to "reduce the risks from hazards to acceptable levels" along with "improving the co-ordination of central government"[10]. Thus, the Director has a pervasive role, and the ability to, for example, encourage local government to reduce hazard risks through land use planning, including "getting agreement" for such forward action[11].

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[8] Johnson and McSweeney Ltd, 2006. *Overview of Flood Management Legislation in New Zealand. Report for the Ministry for the Environment, 2006.*

[9] The current responsible Minister is the Minister of Civil Defence.

[10] The quotes are stated objectives 2C and 2D of the current National CDEM Strategy (2007).

[11] Quotes from the discussion under Objective 2C.

The establishment and maintenance of a separate Ministry of CDEM emphasises the importance of the action to be undertaken under this legislation. However, practice and the role of the Director and CDEM staff in terms of local authority planning is still in its early days[12].

The successful achievement of the goals and objectives of the strategy will depend on current and future co-ordinated action.

Local government has a very wide mandate under numerous Acts, which intersects with all the above areas of legislation.

The Local Government Act 2002 (LGA) provides local authorities a power of general competence, and community responsibilities for forward planning based on outcomes, expenditure and asset development and management within a relatively loose framework. The Resource Management Act 1991 (the RMA) provides the same local authorities with key planning and environmental management (including land use planning and hazard management) roles and responsibilities. Territorial authorities have specific responsibilities under the Building Act 2004 (BA) for regulation of virtually all building development and under the RMA for subdivision of land for development. Regional councils have specific duties and function for flood risk management under the Soil Conservation and Rivers' Control Act 1941 (SC&RC Act) and with territorial authorities under the Land Drainage Act 1908 (LDA)[13]. The CDEM Act empowers a range of agencies including local government.

Both legislation and organisational structure pose some concerns and issues in terms of any drive to improve performance of flood hazard management and flood risk reduction. Although much of the relevant legislation is quite recent, there may still be room for greater legislative alignment or legislative reform in this area to align purpose and clarify flood risk management tools. We return to this aspect later in section 7 of this report. It is also clear however, that many tools currently available are not being widely used, if used at all. Practice elements appear to need improvement and support.

2.2 Current practice

The Flood Risk Review pointed out the diffuse nature of much of the legislative framework and its lack of integration. It drew on previous work which had investigated local authorities experience of flood management across a number of regions and identified good practice and difficulties experienced by those applying the current framework.

The Flood Risk Review identified that while there is extensive activity and numerous examples of good practice, there are shortfalls and issues in relation to forward planning for flood risk reduction in particular around:

- central government role in leadership, guidance and information
- regional council acceptance of roles and responsibilities in planning terms (beyond the clear traditional statutory roles around river and flood control works and land management, and even budgets on those are based on "business as usual", rather than any idea of forward planning[14])
- district/city council roles hampered by leadership at central and regional level, by some legislative issues and limitations, and sometimes by political and officer risk aversion in the face of development pressures
- ideas and experience of practice in methods to integrate resilience, and to address retreat, particularly in urban fabric.

[12] The CDEM Ministry emerged too late to influence the first round of district and regional plans under the RMA. It can however have a useful role in terms of the second generation of RMA plans.

[13] In contrast to the more modern RMA, LGA, BA, and CDEM Act, the SC & RC Act and LDA are relatively archaic and retain a vestige only of their earlier scope. The residual provisions now seem poorly-formulated.

[14] Although the recent review by Harrison Grierson Consultants, 2009, demonstrated that some regional councils are performing well in terms of trying to integrate approaches and undertake forward planning in their region (see footnote 17).

Together, these compound to result in a less-than-proactive planning situation, and elements of "could do better" are found on the national report card. Adaptive methods like raising floor levels, relocating services, and retreat) to reduce risk, and physical measures to improve resilience (such as flood-proofing buildings and services), are not widespread in practice. The larger and better resourced councils are more able to adopt robust approaches, although practice is variable].

The subsequent studies associated with the drafting of a possible National Policy Statement on Flood Risk Management (NPS) have further identified the level of current practice and the "state of play" around the "4Rs" of Reduction, Readiness, Response and Recovery.

In general terms, these studies have identified that local government agencies have been progressing effectively with planning for emergencies, but that the effectiveness of planning to reduce risks through land use planning and related means is more patchy. Investment in new physical works to reduce risk through flood barriers and more effective drainage systems has significantly reduced in the last two decades, with maintenance and improvement of existing schemes being the main priority. The emergence of SUDS[15] concepts in the late 1990s and early 2000s resulted in such concepts being included in both greenfields planning for new areas and brownfields redevelopment projects, with some benefits in stormwater management and flood risk reduction.

Where flood-prone land is already developed, and there are pressures for intensification[16], some flood-reduction measures are now regularly used (such as limiting hard surface areas per site, or setting minimum building floor levels). However, other measures such as retreat from particularly hazardous areas (such as coasts, estuaries and floodpaths) are considered less palatable by local communities, and are only infrequently in place.

The most recent, Jan 2009, review of local government RMA planning activity relating to flood risk management looked at the activity of 17 local authorities – 5 regional councils, 2 unitary authorities and 10 district or city councils – relating to the level of planning performance that the draft NPS as currently worded may require[17]. The current level of performance was found to be very mixed, with most councils having taken some steps towards the "ideal" package of regional integration and allocation of responsibilities, flood risk assessment to identify acceptable levels of risk for communities, provisions in place in plans that seek to avoid risk, and mapping of flood hazard areas and residual risk areas, but none being in the position of having achieved all draft NPS requirements.

Work undertaken on the potential social impacts of implementing a NPS[18] has independently generated a number of additional "ideas to support the proposed NPS". These have emerged from a different and separate process from that leading to this report, but are closely in line with the independent thoughts of the authors of this report.

Options to address most of these latter practice aspects are included later in this report.

[15] Sustainable Urban Drainage Systems. These concepts have been driven by sustainability intentions, and usually endeavour to incorporate a substantial flood management component.

[16] Either as a result of councils seeking to achieve other planning objectives, or due to pressures from landowners or developers.

[17] Harrison Grierson Consultants Ltd, Planning Input to s32 analysis on the Draft National Policy Statement on Flood Risk Management", Jan 2009, Draft. The work included a review of the previous 2006 studies, and interviews or written responses to questions from 13 of these Councils in 2008.

[18] Taylor Baines and Associates, second progress report, Jan 2009, Draft.

3 Actions since the flood risk review

3.1 Flood risk review outcomes

The government completed a Flood Risk Review in 2007 and set out the Review findings in *Meeting the Challenges of Future Flooding in New Zealand* (2008).

The government subsequently approved a policy framework to address increased flood risk in NZ including, a vision, decision-making principles, roles and actions (initiatives) including;

- A policy goal *"Toward Risk Reduction"* as the goal for managing national flood risk
- A draft NPS under the Resource Management Act (RMA) on flood risk management for consideration by a Board of Inquiry in 2009
- Planning guidance for hazards, including flooding for dissemination via the Quality Planning website, and technical guidance on flooding and climate change for planners and engineers available by the end of 2008
- A central government-led forum to achieve good flood risk management outcomes
- A monitoring framework to incorporate flood risk initiatives by the end of 2008/09 financial year (FY)
- A NZ Standard on flood risk management (The New Zealand Standard Managing Flood Risk P9401): 2008
- A long term work programme by December 2008 with initiatives for
  - Updating rainfall and flood frequency estimates
  - A cross government assessment of the national flood risk to assess government risk exposure
  - Targeted assistance for two local authorities per annum
  - A contestable flood risk management fund for local government
- Agencies to work together led by MfE, to ensure linkages are made between government work programmes including climate change, emergency management and sustainable land management.

Also relevant, as they underpin the guidance material for practitioners, are the ongoing science programmes on flood risk reduction and natural hazard management, and the incorporation of climate change projections and impacts information into river flow projections.

3.2 Progress since flood risk review

Some progress has been made since the completion of the Review. The key areas include dissemination of information about the government goal of risk reduction for flood management (via CDEM Groups), guidance material and training packages, the preparation of a draft NPS, funding for improved radar for rainfall forecasting, a new Rural Assistance package for flood recovery, and increased investment in research and tools for flood risk management. The details of this work are set out in Appendix 1.

3.3 Effect of the activities

The effectiveness of the Flood Risk Review policy and activities cannot yet be assessed fully, since all activities are not yet in place or completed. However, all activities were designed to provide additional tools for flood risk managers to reduce risk.

In particular, the completion of the guidance information, the GNS/NIWA and IPENZ courses, the technical studies, additional radar coverage and the ongoing research programmes are important milestones, since decisions and investments being made now relating to assets that will be in place for some time, need to have the new information and the impacts of climate change on flood risk factored into their design, to ensure flood risk is not exacerbated. This new information is informing such decisions.

Extensive work has been undertaken to prepare and progress a draft NPS for Flood Risk Management. The NPS on flood risk management can form the framework for signalling flood risk *reduction* as the goal for flood risk management in New Zealand. It could provide the means to ensure some consistency in practice in reducing flood risk across New Zealand, at least for decisions made under the RMA. In the meantime, the NZ Standard on managing flood risk (high level principles) and the Building Code, are the only standards for planning practice and building consent processes and will be used as default standards. The NZ Standard is, however, a process standard which encourages communities to make decisions based on risk, taking into account the nature of the risk and affordability in a recognised changing context.

The proposed Local Government Forum on Flood Risk Reduction was also intended to provide a partial mechanism for the sharing of information and raising the profile of the flood risk reduction issue amongst councils. This has not yet been implemented.

Until the NPS is in place, which is realistically at least 2 years away, the NZ Standard, the guidance notes and the de facto standards in the Building Code (which have not been reviewed recently), provide the only central government guidance on the direction of flood risk management in a context where the governing legislation is diffuse and not well integrated.

Improvement in practice will most likely be slow without some higher profile leadership of flood risk reduction as the objective of flood risk management.

3.4 Need for an integrated approach

It is widely recognised that there are many players in flood management, and many agencies operating under numerous mandates which contribute to society's awareness of flood hazards, developing and applying means of reducing risk, and responding to events. The Flood Risk Management Review identified and set out roles and responsibilities and also noted some gaps. An integrated approach will be necessary to ensure that all relevant agencies can fulfil their roles, and that comprehensive decisions are made that enable communities to reduce flood risk and ensure resilience to events.

The approach to flood hazard management nationally is focussed around the "4Rs" – Reduction, Readiness, Response and Recovery. This provides an integrated way of looking at flood hazard management and how it can be effectively applied. It reflects a general consensus (at least by the Flood Risk Review Steering Group[19]), that there are specific and complementary roles for a wide range of communities and local and central government agencies.

There are some additional actions that could be taken to ensure that the flood risk reduction objective is implemented and to ensure that greater integration occurs between agencies at all levels.

In particular, there are opportunities to better integrate the decision-making made by the different central and local government agencies, by more explicitly focusing on flood risk reduction, and in situations where this is not practicable, on risk reduction at the pre-event and readiness stages and at the response and recovery stages of a flood event.

Currently, the risk reduction part of the "4Rs" is not well set out in one place (statute or otherwise), in comparison with the readiness, response and recovery activities such as in the Guide to the National CDEM Plan and the recovery management Guidelines from the Ministry of Civil Defence and Emergency management (MCDEM). There is a risk, and some evidence, that if reduction opportunities are not captured before, during and after flood events, flood risk will be exacerbated, even without factoring in climate change effects e.g. the flooding of the Kaeo Rugby Club buildings twice before risk reduction action was taken. This inevitably increases community and national costs of flood hazard over time and with climate change, costs of events can be expected to increase. In addition when climate change effects are factored in, it is likely that both the number and extent of events may increase in many areas.

[19] See section 4.4, "Meeting the Challenges of Future Flooding in New Zealand", ibid.

As noted in Section 2, some of the reasons for the current lack of integration are historic. The following shortcomings have been identified and provide opportunities for change;

- different styles of legislation (e.g. legislation that defines duties compared to legislation that is empowering or directive)
- no overarching consolidated flood risk legislation or agency. As explained above, flood risk is dealt with in several statutes – Environment Act, RMA, BA and Code, LGA, SC & RC Act, LDA, CDEM Act
- there is some misalignment between different legislation (e.g. RMA and the BA) as discussed later
- there is no legislative expression of flood risk reduction being a primary goal of flood risk management
- some specific legislation for flood control focuses on engineering structures for protection, with no provision for non-structural flood risk management activities
- retreat options are dealt with on an ad hoc basis, and there is as yet little experience of this in practice
- flood emergencies are dealt with through the CDEM Act and isolated from the planning process
- there is no explicit link or consistency between discrete government policies that provide assistance after floods e.g. Adverse Events Policy for Rural Assistance and the CDEM assistance policy set out in the Guide to the National CDEM Plan
- the EQC covers specific types of hazards on land and residential property if house and contents insurance is in place. This does not extend to damage to buildings from flooding, which is NZ's most common natural hazard. See section 7.
- private insurance covers flooding as part of contents and house insurance
- there is no insurance cover which can assist with improvements following events (e.g. flood proofing, raising floor levels and services)

Historically, the national focus has largely been on assisting flood affected people and assets to recover quickly during and immediately after a significant event. Little effort has been expended in considering and implementing improvements at the time of recovery from a flood that would reduce the effects of the next flood event. Consequently, areas at risk from ongoing floods continue to be exposed and this risk will increase as a result of climate change. In addition, the land use planning system has been inherently slow to address ways of reducing flood risk and exposure through the different levels of planning by regional and district councils in an integrated way and has had limited support from central government.

This report now provides discussion, identification and analysis of options for improvements, including through statutory and non-statutory direction and guidance to the planning process and also integrated into the response and recovery phases after an emergency. Such an approach has the potential to create more resilient communities that are building on the learnings from flood events.

4 Role of Planning

4.1 Introduction

A logical strategy for flood management and long-term flood risk reduction would determine the nature and significance of the issue in any geographic area and marshal an appropriate level of resources to address the issue in the most effective way.

As discussed above, there is uneven practice and variable levels of resourcing. As a general comment, New Zealand appears to perform best in aspects of readiness and response[20], and less well in terms of recovery and flood risk reduction.

Some of the most cost-effective ways of addressing future hazards almost certainly lie in the area of future planning for land uses, buildings and infrastructure, including retrospective consideration of existing communities and adaptation opportunities.
This section looks at what needs to be done to improve planning performance. It first outlines the context and general issues in terms of practice and then discusses specific issues. It then outlines changes that could address some of the more pressing planning issues.

4.2 Context

4.2.1 Role of planning

Inherent in past practice has been planning for flood protection in the area of community assets – stop banks, river diversion schemes, and effective stormwater drainage systems. This type of planning will and should continue, and assets need to be maintained. However, by adopting the NZ Standard process, alternatives to address risk must always be assessed, and communities may seek to choose avoidance and mitigation methods that reduce flood risk and that are different from those of the past. In addition, new and replacement development should be built to a standard or in a location where risks are avoided
or kept very low.

> *"Development control is a central part of the process of managing flood risk, by avoiding development in risk areas where possible, and where such building does take place, by ensuring that risk is reduced both to the development itself and for those living nearby".* Pitt Review "Learning Lessons from the 2007 Floods", report to UK Government, ES25.

The diagram on the following page indicates that flood risk management is an iterative process, with planning and pre-planning essential in terms of Reduction through avoiding and mitigating the effects, and Recovery in terms of a focus on learnings from previous events. Readiness and Response relates only to events so if sufficient planning takes place during these stages it will avoid and reduce the impact of the events.

[20] This is probably largely due to the long-term nationwide and institutionalised recognition of, and civil defence emphasis on, earthquake risk.

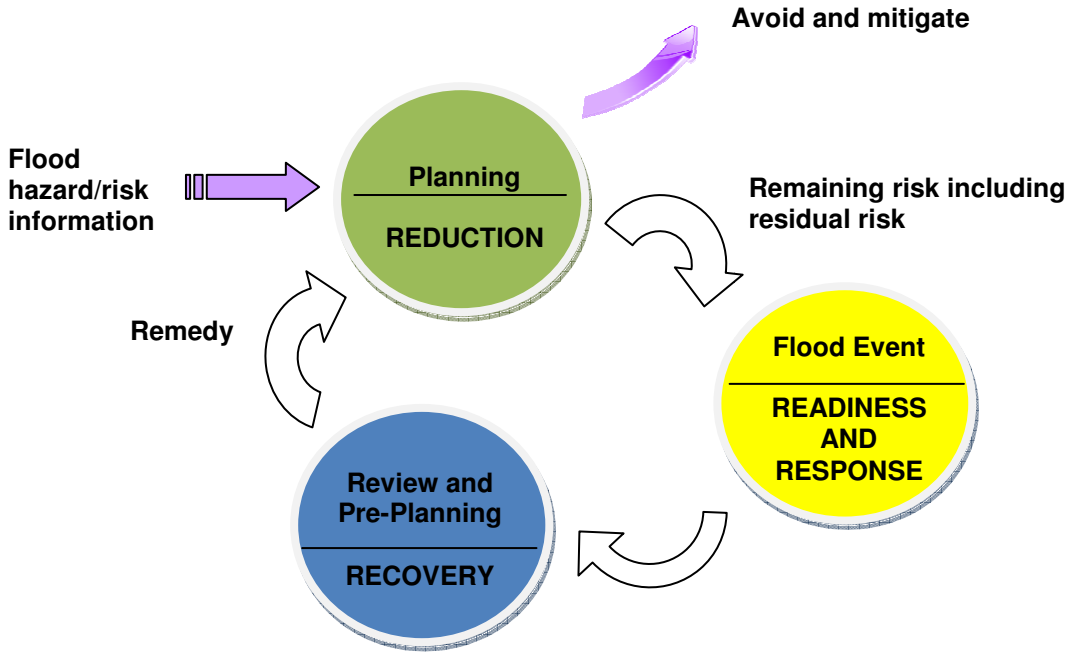

Figure 2 : The Cyclical Nature of Flood Risk Management

The Flood Risk Review identified "top down" and "bottom up" planning aspects where improvements could be made. These are now discussed.

4.2.2 Top down issues/model

The RMA framework relies on a careful interplay of roles and responsibilities. In preparing a policy or plan, or considering an application or a private plan change a Council looks "upwards" for guidance, as well as at its functions (section 30 for regional councils, section 31 for district councils).

The "ideal" framework for planning flood risk management under current legislation would include the following:

- Adequate information about flood hazard and the capability at all levels to produce and use it.
- National policy guidance (section 57) – if not a national environmental standard to be achieved, at least guidance on how to interpret "effect" (section 3, particularly section 3(e) and 3(f)). What methods should a Council use and how precautionary should they be?[21]
- Regional policy guidance in an RPS. This responsibility lies in section 30(i) (a) and (e). If flooding becomes a matter of national significance (i.e., through an NPS), emphasis will then focus on a regional role under section 30(i) (b) and strengthen the need for regional councils to identify and plan for areas most at risk within the region. The RPS should include objectives, policies, methods, reasons and anticipated environmental results in terms of section 62, and needs to clarify roles and responsibilities in terms of section 62 (1) (i) (i).
- A regional plan (applying to flood hazard issues, in terms of section 65 (1)) which identifies areas of risk and includes land use methods and rules. Regional land use rules have the benefit of extinguishing existing use rights in terms of section 9 (3) (c.f. district land use rules, which protect existing use rights and allow reinstatement of buildings and land uses). Thus regional rules can require progressive adaptation in areas already developed as, well as setting rules for new or intended development[22].

[21] The current draft NPS appears too vague to be helpful in this respect.

[22] Note: such regional plans are uncommon, as land use control is seen as a territorial function. However, some regional plans are now adopting land use control in floodable areas, including areas close to coasts and near to estuaries – for

- Ideally, a catchment management plan for the catchment to which the regional flood hazard applies. This would provide the basis for the integrated management that regional councils are required to achieve under Section 30(1) (a)), and would address any "upstream" catchment aspects that could exacerbate downstream flood risk[23].
- District land use and subdivision rules would sit alongside the regional land use controls, and the BA would also be administered in a way that recognised the regional rules (see section 37 BA, which prevents building work until any relevant resource consents are obtained).

The ideal approach described above is rarely found in practice despite the legislative framework (and some case law that would support it), due to the following:

- uncertainty about regional councils' rights, responsibilities and roles in relation to land use control for natural hazards such as flooding, which may be seen as localised and therefore a territorial local authority role.
- lack of direct involvement by regional councils in land use control, which is seen as the traditional role of territorial authorities
- lack of power for regional councils to influence or control subdivision – a precursor to land use – which is a sole responsibility of territorial authorities, and in which regional councils have no role.
- general uncertainty and ambivalence in terms of some types of integrated urban planning (i.e., planning for retreat, safe havens, access and emergency escape routes etc).

Transfer of responsibilities between levels of local government is possible, but is infrequently done in a formal way. Where it is done, it is limited to some effects (such as noise). Combined plans (regional/district) can be prepared (section 78A) by regional and territorial authorities in co-ordination, but these are found only in the areas of unitary authorities[24]. Unitary authorities need to determine if rules in their resource management plans are district or regional rules, and land use rules are normally considered to be district rules, and thus retain existing use rights.

The above top-down planning scenario would require little legislative change, but would require more detailed area-based land use planning by regional councils and closer working together by regional and district/city councils in administering overlapping land use rules. This has however, been achieved in some high risk areas – for example, coastal planning in Hawke's Bay.

This model could be enhanced by central government support and guidance within the framework of a NPS. Alternatively, local authorities could share experience and learn from each other in applying improved and more rigorous control at regional level.

4.2.3 Bottom up issues / model

The alternative model is founded on most common current practice, where regional councils have not adopted a land use management role in relation to flood hazards. In the absence of the superior powers available to regional councils, district and city councils administration is exposed to a number of shortcomings.

example, the proposed Hawke's Bay Regional Coastal Environment Plan includes land use rules which prevent all but the most modest maintenance of existing buildings as of right, and a consent is required for any other work and any new uses in hazard areas, with the degree of consent difficulty (i.e. discretionary, non-complying or prohibited) dependent on the expected level of hazard.

[23] Non-statutory plans do not go through RMA processes, but may involve wide consultation and include a range of policies, processes and methods. They can support statutory plans and can be referred to in statutory plans as "methods" to achieve the policy of the statutory plans. They are "other matters" which can be taken into account when RMA decisions are being made. The Hutt River Catchment Management Plan, prepared by Greater Wellington Regional Council, is an example of a plan which integrates river works, river protection, land use management (including floor level policy and standards), as well as allocating responsibilities for hazard management.

[24] Except where districts have combined, but they are bound by the function of territorial local authorities under the RMA.

- As with the top down model, good information and a NPS or environmental standards that clarifies effects, methods and the application of the precautionary principle, is essential for forward planning.
- The RPS needs to provide policy methods and roles as outlined above. If land use control is determined to be a responsibility of territorial authorities, land use planning in terms of district plans will need to be relied on.
- A statutory or non-statutory catchment management plan, ideally prepared by the regional council, given its various functions, would always be beneficial in terms of territorial authorities district planning roles.
- District plans cannot extinguish existing use rights under section 10 and 10B, and thus cannot prevent exact reinstatement of buildings and other structures following a flood event. However, district plans can control type and intensity of new land uses and developments in a range of ways. They also control subdivision and section 106 enables territorial authorities to refuse subdivisions in areas of natural hazard exposure, including flood hazards, even if such subdivision is otherwise permitted.
- The BA on its own has limitations in terms of abilities to limit reinstatement, or to require flood-proofing of development following a flooding event.

Where land use planning for flood hazard reduction is left to territorial authorities, they lack some important powers relating to the ability to manage retreat or to force adaptive change. Legislative changes would be needed to give territorial authorities equivalent powers to regional councils in terms of flood hazard areas. However, such changes have not been sought by territorial local authorities, who favour a range of other mechanisms to achieve flood risk reduction in existing communities.

4.3 Aspects of particular concern

4.3.1 Lack of national guidance / leadership

While district and regional councils are required to plan to promote sustainable management within their areas, which for many areas will include flood risk reduction, they lack much advice on what to do and how to do it. Until relatively recently, local authorities have had little support and there has been little interest expressed from central government to local government about the importance of hazard management, including flood hazards. While this has recently changed to some extent, local government planning agencies still lack central government guidance in some key areas. The better resourced councils have been able to retain capability and competence in flood risk and flood hazard management, but others have suffered from loss of key people with relevant knowledge and inadequacy of resources to undertake flood hazard planning.

Best practice guidelines are provided by MfE, but lack detail or any force.

4.3.2 Private plan changes / Resource consent applications

Territorial authorities are subject to applications for land use activities and requests for private plan changes in which flood risk may not have been identified as an issue. In such circumstances, they may lack information to make wise decisions in terms of flood risk management because of lack of a NPS or national guidance or leadership, lack of available information, poorly expressed or inadequate policy and plans at regional level, and lack of engagement in statutory process by the regional council, or other interested agency such as MCDEM or EQC. A robust NPS could be very helpful here as it could override some of the other gaps identified above, particularly if a precautionary approach was indicated by the NPS.

In the context of the RMA, particularly where private property development rights are concerned, the statutory framework and processes are demanding and require a relatively high level of "proof" of an effect, or considerable policy strength, to justify intervention. These elements are tested when plans are prepared, and also with processing of resource consent applications and private plan changes.

Improved information and prediction capability (under way) will assist the roles of both regional and territorial authorities. However, policy support through a NPS (and its contents) is essential to give a greater mandate to councils to take a more robust approach. Such policy should emphasise the need for a precautionary approach (as in the NZ Coastal Policy Statement) and provide some guidance on the time context for flood risk planning.

4.3.3 Time context for risk reduction

The time context for planning is not specified anywhere. District and regional planning instruments are subject to a complete review every ten years, however land use change, particularly from rural to urban, is usually a permanent change. Different time horizons may be relevant for different types of flood hazard. Climate change impacts, as noted, are likely to increase flood risk exposure progressively over time in many areas.

Case law under the RMA indicates that 100 years is an appropriate timeframe for coastal planning. However, the Building Code provides in E1 for a building design life of 50 years for main structural elements, or the need for protection from a 2% AEP[25] flood. Determinations under the BA indicate that less than 50 year timeframes may be acceptable in flood hazard areas, provided a title is tagged to that effect in terms of section 74 of the BA. Research by BRANZ suggests that houses built now may last for at least 150 years, and that climate change predictions for 2070 should be applied to houses being built now.[26]. The UK applies 100 year scenarios as a basis for flood hazard planning.

As a result there is considerable confusion about how far into the future flood risk reduction provisions should apply. The NPS could provide guidance for main planning provisions, with the risk-based approach being applied for specific developments in identified flood prone areas.

4.3.4 Flood hazard information for planning

Information availability on flooding is also problematic. It is highly variable around the country and staff changes mean that institutional memory is being lost in some areas. Both past records and future predictions are needed as a basis for planning. Local authorities can be challenged on the reliability of both their historic information and the basis of their predictions, an issue that has been compounded by growing awareness of climate variability.

While there is considerable useful information around, it is not readily available in one place and is often not available to the public. There is a need to accept that information is not perfect, but it can be expected to improve over time, and that inadequacy of information is not a valid basis to "do nothing". A "do-nothing" approach will exacerbate risk

4.3.5 Techniques and methods for risk reduction through planning

Planning for flood risk reduction involves a variety of techniques which may range from competent structure planning of new development areas (providing for natural drainage and flood hazard protection); complete avoidance of new development in hazard prone areas; density, coverage and floor level controls in new and existing areas; retrofitting for flood-proofing of development in existing areas; and retreat or removal of existing development in hazard areas. Planning can encourage ponding areas, retreat areas, maintenance of access above flood levels, and flood refuge areas. New Zealand's experience in preventing development in the most flood prone areas

[25] AEP is the annual exceedance probability, meaning the chance of exceeding a particular flood level in any one year.
[26] O'Connell, M and Hargreaves, R, "Climate Change Adaptation", BRANZ Study Report No 130, 2004.

is variable, and that relating to retrofitting and managed retreat is very limited[27]. The RMA, the LGA and the CDEM Act all promote local communities determining their own future. However, local government operates nationwide on the basis of dissemination of ideas following innovation, through a range of mechanisms.

There appears to be little innovation at present in terms of methods to reduce flood risk exposure, and this is an area where a good practice guide, or guides, is desirable. Guidance available at present is at high level only.

In particular, physical retrofitting of existing buildings and infrastructure is an area where innovation appears to be very much needed, to encourage uptake of such provisions, either in advance of events or, more realistically, immediately subsequent to an event. Another aspect where there is little experience is in the planned and managed retreat of development from most hazard exposed areas (floodways and the vicinity of the coast and estuaries).

4.3.6 Planning – Monitoring and review

RMA planning requires identification of expected environmental outcomes (including means of monitoring and measuring of effectiveness) (section 35), and 10-yearly reviews (section 79). Policy statements and plans however can be changed at any time under a rolling review. The experience of monitoring in terms of flood responsiveness is very limited, and suggests that flood risk reduction is currently not highly prioritised within local government.

The Recovery phase following from flood events should result in information which leads to reconsideration and possibly a formal plan change(s). As outlined in section 6, flood events themselves could lead to a review.

This is an aspect where national leadership, support and encouragement as well as best practice guidance is needed.

4.3.7 Specific issues around the Building Act

There are a number of issues relating to the BA and its application. There is a level of ambivalence both in the legislation and in planning case law about the extent to which the RMA can address hazard issues when the BA and codes might appear to provide adequate hazard protection[28].

Regional councils and territorial authorities are required to control the effects of natural hazards, and thus the RMA should logically be seen as the “first line of defence” in reducing risk exposure. The BA then should address remaining issues that are inherently readily manageable through building design.

The BA contains provisions that link with the RMA (when a RMA consent is needed)[29], and has its own purpose and principles relating to sustainability, safety and utility of buildings. While not a planning statute, and specifically subservient to the RMA through section 37, its contents influence the ability of territorial local authorities to manage development in relation to flooding areas where neither a district, nor regional plan limits development. Backstop provisions are found in sections 71 to 74 of the BA, as discussed below.

[27] Retreat experience is generally limited to the hazard becoming so cataclysmic that sections 121 to 129 of the BA (relating to unsafe buildings) need to be applied.

[28] There appears to be no RMA case law on the relationships between the two Acts, and no BA determinations, that relate directly to flooding. However, a relatively recent Environment Court case highlights the reliance placed on the BA in terms of managing risk to people and property in proximity to active faults – Petone Planning Action Group vs Hutt City Council (W071/08, and CIV-2008-485-1112).

[29] Section 37 of the BA requires a local authority to attach a certificate to a project information memorandum (PIM) if a necessary resource consent has not yet been obtained. The certificate must either state that the work cannot proceed until the consent is obtained, or that only specified building work can be undertaken.

Issues have also been raised in relation to the BA enabling the replacement of existing development under the principle of "like with like". This is a "recovery" related provision which along with BA provisions relating to urgent works, are discussed further in section 6.

The purpose of the BA relates to the health and safety of building users, and the general concept of sustainable development. There is no explicit natural hazard protection purpose which, in the absence of specific code provisions, can be brought to bear on the interpretation and application of the Act[30]. While sections 71 to 74 are entitled "Limitations and Restrictions on building consents: construction of building on land subject to natural hazards", there are wording problems in these sections.

Section 71 provides that a building consent authority must refuse to grant consent to construct a new building, or undertake major alterations to an existing building, on land subject to a natural hazard. However, this only applies if the authority considers that the work will not adequately protect the building or land from the hazard. Section 72, in addition, states that a building consent must be granted if the authority considers that there will be no worsening of the hazard on the land on which the building is to be located, and the normal Building Code requirements can reasonably be modified. The test of "reasonableness" is a difficult one which needs to be assessed on a case by case basis, and is readily challenged. If a consent is granted under section 72, the title of the land concerned must be "tagged" in terms of sections 73 and 74.

Councils are often put under pressure by land users and building owners to allow building development in hazardous areas because of the specific and imperative wording of section 72, and then are further pressured not to tag the title in terms of section 73.

While section 71 appears robust on the surface, section 72 is worded in a way that is contradictory to section 71, and causes specific problems in terms of a council's ability to decline consents to buildings in hazard-prone areas. Both sections relate primarily to effects of the hazard on the land, or property on other land, rather than to the safety and resilience of the building that is at issue itself, or its users.

The Building Code relates only to surface water flooding. It does not apply to flooding from sub-surface water, and, some councils consider that it cannot apply to residual flood risks when structural protection such as stop banks are in place. There is a range of interpretations and practices under the Building Code relating to flood risk reduction. However, councils use a range of "standards" in other documents to decide whether reasonable provision can be made to flood-proof buildings and to attach conditions under section 73, including provisions in non-statutory catchment management plans and engineering standards. These issues do not arise if consent is also required for the building or its use under the RMA, although there is still some debate about the extent to which a RMA consent can include conditions which are more usually associated with building consents[31].

It should also be acknowledged that if the BA provided the ability for flood resilience provisions to be applied at both the time of the original consent and at the Recovery stage, this could reduce the need for intervention under the RMA, particularly in lower risk (ponding) areas.

4.3.8 Specific issues around council powers to force land use change

Use of land can be an appropriate means of avoiding or managing flood risk. A number of local government agencies have indicated uncertainty about the ability to acquire and hold land specifically for non-structural flood risk reduction purposes. Such land acquisition could include managed retreat of existing development, flood ponding and diversion areas, SUDS, and refuges, amongst others. The land can be held for recreation or ecological (multiple use) purposes.

[30] This has not influenced strict and rising building code provisions relating to earthquake risk. In terms of flooding, code provisions relate only to building protection against localised surface water intrusion and do not readily enable residual risk (for example, from overtopping of flood protection structures) to be taken into account

[31] For example, while building location on a site and minimum floor levels are accepted RMA consent conditions, the adoption of other flood-proofing measures and on-site stormwater management provisions are normally considered BA matters.

A review of legislation suggests that the RMA and LGA both provide adequate ability for acquisition of land for such purposes[32]. It appears most likely that what is being reflected is a council reluctance to compulsorily acquire land, particularly land at risk, from a reluctant owner[33], and/or to invest in, hold and maintain land for "non productive" long-term purposes. Ideally, the importance of such land, and the need for its acquisition, is a matter that should emerge from local planning efforts, along with CDEM activity.

As this aspect appears not to be at issue, except in that it reflects a reluctance by some local authorities to engage in purchase and management of land for some flood risk reduction purposes, it is not addressed further in this report. However, it is an area where practice is currently weak, particularly in relation to managed retreat, and could be the subject of guidance material.

4.3.9 Funding for reporting, planning and flood risk management

The Flood Risk Review found a lack of transparency in terms of budgeting and reporting on both planning and delivery of flood risk reduction activities. As the LGA does not include any specific requirements relating to flood hazard management or flood risk reduction (in contrast to water and sanitary services, parks and reserves and libraries) this is perhaps not surprising[34]. However it does not assist evaluation and understanding of what is actually spent and/or what might be reasonable. The general impression is that past expenditure is projected into the future as a proportion of rates. This may be unrealistic, particularly for local authorities who are behind the general field in planning for flood risk reduction. Some communities appear particularly under-resourced e.g. West Coast and possibly Northland. The Flood Risk Review suggested a number of ways of funding such communities, including central government beneficiary and rates contributions, or one-off grants.

Given the community cost of flooding[35] it is important that sufficient funding is available to local government to adequately pre-plan for reducing flood risk. There is an issue that sufficient funds are found for event response each year for floods but priority is not given to funding risk reduction identification and activities once the pressure of the event itself has passed. This highlights the importance of raising the priority and profile of flood risk reduction activities and their funding.

There is also a strong interest from central government agencies to know how and where money is spent on flood risk reduction so that both total cost and effectiveness can be reviewed. Lack of a consistent local government reporting framework under the LGA makes this evaluation difficult.

4.4 Options which would assist with land use and infrastructure planning for flood risk reduction

This section generically addresses problems in statute or practice, related to planning as outlined above, and suggests options.

4.4.1 Flood hazard information

There are a number of real issues to be addressed:

1. Despite considerable information in some areas about past flooding and anticipated flood risk, there are characteristics of flood hazards which mean that prediction of future flood events can never be precise. Modelling future flood events based on knowledge of past events, taking into account recent and anticipated changes in variables, such as landuse and climate change, is of varying reliability. It is highly dependent on the quality of available information. The uncertainty is also a direct consequence of the large number of

[32] Under the RMA section 86 enables acquisition in terms of achieving objectives and policies in a plan, or to terminate a non-complying activity. Under the LGA section 189, broad powers to acquire land are provided in terms of public works.
[33] Owners may not want to part with land, or may simply seek to force a council to follow the complex Public Works Act procedures as a means of increasing the offered price.
[34] The SC & RC Act and LDA cover these aspects. Note that roading provisions are also not specifically included in the LGA.
[35] Estimated at $250 million or more, per year. See section 1.2 of this report.

variables that contribute to flooding, and how they vary over time and place[36]. Councils have different levels of information of different degrees of accuracy, and variable access to modelling capability and tools.

2. Present flood hazard information is often not publicly available and councils face strong pressure from landowners and development communities for it not to be available, as such information is seen as reducing land values. While some district and regional plans show flood hazard areas, many known floodable areas are not shown[37]. A district council is required to provide hazard information only when a LIM or PIM is sought under the Building Act, and this is a highly imperfect way of conveying to a community what its level of flood risk is. It is reported that many people purchasing land do not seek LIMs[38], and a flood risk only comes to light when a building consent is sought and a PIM is issued.
3. The RMA requires public processes, and councils are regularly challenged on adequacy of information, particularly when provisions are included that limit or reduce development expectations on the basis of natural hazard exposure. Responding to challenges increase costs, and councils may choose to withdraw provisions or accept a lower standard of risk reduction, rather than face a lengthy and costly statutory process. This is particularly the case with the present lack of national policy and guidance[39].
4. While the stocktake demonstrates that considerable steps have been taken nationally to improve flood hazard information for planning purposes, improved information in some areas may serve to highlight inadequacies in terms of flood hazard information in other areas. The following actions would be extremely helpful to Councils in addressing issues around flood hazard information.

Option 1 The NPS to state that regional and district plans should take a precautionary approach in the absence of reliable information on flood hazard[40].

Option 2 The NPS to state that

- inadequacy of information is not a reason for not planning to avoid or reduce flood hazard.
- local authorities should use the best available information to identify areas at risk[41]
- local authorities should continue to improve their information over time
- planning should take into account the effects of climate change[42] and other changes that could modify flood risk, including expected "upstream" landuse changes that are anticipated and/or planned for
- local authorities should apply the NZ Flood Standard and its risk based approach in planning and decisions

Option 3 The NPS to require local authorities (regional and district) to develop and maintain a publicly-available repository of information, on past and predicted flood information, including for predictions, information taken into account

[36] Short term variables such as rainfall duration, groundwater levels and tidal cycles can mean the difference between the presence or absence of a flood. In the longer term, river bed levels and upstream catchment changes can increase or reduce flood hazard.

[37] A search of a Council's website may yield flood risk information from a range of other documents, but much of the information that Council officers have is not readily available except by reference to a particular officer. It appears that knowledge is sometimes lost with staff changes.

[38] A 2006 survey by Local Government New Zealand found that LIMs were issued for just over 30% of changes in the Rating Information Databases (triggered by changes to the ownership of rating units) – LGNZ, 2008, Land Information Memorandum Survey of Territorial Authorities.

[39] It takes a particularly resolute council to persist when their predictive information base is limited. The Hawke's Bay Regional Coastal Environment Plan, for example, is under challenge on the basis of the accuracy of its predicted coastal erosion rates.

[40] This is also in line with the CDEM Act 2002, section 7, and the NZ Coastal Policy Statement.

[41] Boundaries of areas delineating a level of flood hazard risk provide the basis for important planning tools. Within such delineated areas, district and regional plans may prohibit certain types of development, but more often activities in risk areas would be discretionary or non-complying. Development can be refused, or allowed if appropriate mitigation is provided via conditions.

[42] See section 4.3.3 of this report in relation to the time context for planning for flood hazard.

and assumptions made, and a commentary on reliability, in terms of section 35(i) with or without a timetable. (See also Option 38, a national repository of information and monitoring.)

4.4.2 Resource Management Act

Flood hazard is integrated into the RMA in the same way as all other hazards and largely relies on local authorities to act in accordance with the Act to address flood hazard. Flood hazard has been identified in the Flood Risk Management Review and elsewhere as a matter of significance to many communities, and as a matter of national importance. There is however a question around whether any specific changes are needed to the RMA itself to improve practice, given that a NPS is already intended. The following possibilities exist:

1. Flood hazard could be specifically highlighted in Part 2 as a nationally significant issue. This is not favoured, as section 5 gives considerable scope for flood issues to be taken into account when any decisions are made under the Act. However, section 7(i), specifically added in 2005, relates to an important aspect of flood hazard – climate change – as a matter to which particular regard must be had. There is little experience of the application of this particular provision, although there is some indication that both councils and courts are unclear about the scope of "effects" in the context of climate change. An addition could be made to either section 2, interpretation, or section 3, the meaning of "effect", to describe what section 7(i) may encompass, including increased flooding effects. Such added wording should be inclusive (as with the definitions of land, noise, industrial or trade process, benefits and costs). Alternatively, a new item could be added to section 7 relating to flood risk exposure.

2. Local authorities are seeking clarity in terms of the levels of acceptable hazard, and also the "planning horizon" that policy and plans should be directed towards. Instruments in the RMA include national environmental standards and a national policy statement. A national environmental standard for RMA planning for flood hazard would be difficult to express as a "technical standard, method or requirement", and it would be unlikely to be effective given the probability basis of the risk and the extent of current exposure, which would have to adapt to meet a precise standard. It would also be out-of-kilter with the general thrust of the RMA which promotes sustainable management including acknowledging that communities are endeavouring to address multiple variables. A suitably-worded NPS, is likely to be a more effective and acceptable vehicle to support local authorities in endeavours to address flood risk reduction. There is scope for objectives and policies in a NPS to set specific targets as well as to provide guidance. An objective could aim to ensure that flood exposure of buildings and assets is not worsened, and that policies and plans progressively reduce flood risk. It could set a risk-based standard to be worked towards (for example, for habitable buildings no more than 1% AEP for key infrastructure, including essential community facilities, no more than 0.25% AEP), and could determine (or set out principles for) areas where no new development should take place and where existing development should be phased out[43]. It could also require councils to adopt a minimum 100 year horizon for decisions on developments within identified flood risk areas[44]. The RMA does not require any change to achieve an appropriate NPS.

3. Territorial authorities can control new uses and buildings but sections 9, 10 and 10B apply in terms of existing uses and buildings. Under these provisions a use can generally continue at the same character, intensity and scale unless a regional rule is introduced in a regional plan, in which case an existing use can be required to obtain a consent under section 20A (2). If consent is refused, technically a use can be cancelled and a structure could be required to be removed[45]. The development of regional rules to manage land uses in this way is rare, but not impossible. There is some indication that this technique is

[43] Exclusion areas would include flood channels and areas below a specified sea level rise.

[44] Case law indicates 100 years in a suitable timeframe in relation to coastal hazards. BRANZ however indicates that current development may have a life of 150 years.

[45] This would be a difficult route for Councils to use to effect the removal of buildings at risk, but is a useful backstop in terms of controlling new investment in buildings. The technique is being used by HBRC to effectively phase out development in areas of active coastal erosion (e.g., Haumoana).

becoming more accepted, and it is particularly relevant to flood hazard, as regional councils have key practical capability in determining risk and addressing coastal and water-related issues (including flood hazard). An alternative would be to provide territorial authorities the ability to develop rules that cancel existing use right. This would require changes to sections 9, 10 and 10B and could probably only be justified on the basis of exposure to all natural hazards. It would be difficult to justify on the basis of flood risk exposure alone.

4. For subdivisions, section 106 provides territorial authorities with backstop powers to decline subdivision consents on the basis of natural hazard exposure, regardless of rules in a plan. Subdivision is a key step leading to new or intensified development, and is often the step where land values increase and development capability is enhanced. This section is relatively comprehensive and robust. While some councils are nervous about using this section, others now apply it with confidence. This section also enables specific risk management conditions to be placed on land titles. No change is needed to this section, but its use as a tool could be referred to and confirmed in NPS. Some thought has also been given to a similar provision in terms of landuse activities (including structures). This would not work, as, unlike subdivision, many land uses can occur as of right. Rather, the district plan or regional plan should contain adequate controls over land uses in potentially floodable areas, so that any land use change can be considered in terms of its effect on future flooding (including on and off-site effects, and cumulative effects).

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5. Most RMA action is devolved to local authorities, and worked out in practice between regional and territorial authorities. A significant and effective change was made in 2005, which effectively elevated the importance of regional policy statements by requiring plans to give effect to and regional policy statements as well as national policy statements (sections 67(3) and 75(3)). No legislative change is considered necessary – rather, a NPS and guidance material can improve flood risk management through land use and other planning.

Option 4 Add a new item to section 7 RMA to require specific consideration of flood hazard or flood risk exposure.

Option 5 Clarify the meaning of the effects of climate change in sections 2 and 3 RMA to encompass increased flood risk.

Option 6 Use the RMA instrument of a national environmental standard as a basis for planning (e.g., achieve a nationwide risk exposure from flooding of less than a specified AEP – e.g., 1% max[46].

Option 7 Use the RMA instrument of a NPS to provide a good level of direction to councils in terms of flood management by way of a planning timeframe and a risk based target (see discussion in 2 and also Options 1, 2 and 3).

Option 8 Provide territorial authorities with powers to cancel existing use rights (analogous to those provided for regional councils) where flood hazard is an issue. This would involve exceptions in terms of RMA sections 9, 10 and 10B.

4.4.3 Building Act

While not strictly a planning statute, the BA sets standards through the Building Code. It also contains backstop provisions in relation to natural hazards. However, the flood hazard provisions are worded in ways that technically limit the ability of territorial authorities to refuse consent. Local authorities are nervous about the wording of both section 71 and 72 as currently worded.

1. An additional purpose in section 3 or principle in section 4 of the BA referring to natural hazards in general, and flood hazard in particular, would improve the ability to administer sections 71 to 74.

[46] The NES would involve consultation and advice from a range of experts in its development, as well as wider public input.

2. Rewording section 72 in particular, so that territorial local authorities do not feel compelled to grant consent, even in obviously hazardous situations (and builder/developers are less able to pressure for consents), would also assist in the application of section 71[47].
3. The difficulties around the application of sections 71 and 72 highlight the possibility of/need for code provisions which go beyond those in E1 to encompass residual risk, and flood-proof retrofitting of existing buildings with before or following a flood event. While developing such a code would be a complex and innovative task, there would be many benefits in terms of long term management of flood risk.

Option 9 Add a provision to sections 3 or 4 of the BA which specifically refers to buildings being resistant or resilient to natural hazards (including the range of sources of flood risk).

Option 10 Reword section 72 of the BA as an option rather than a compulsion – i.e., change "must" to "may" – and add to (c) "or to apply additional or specific conditions to address special features of the land covered under section 35", or like wording.

Option 11 Consider and progress the introduction of a flood risk code, which would promote flood resilient buildings (through a range of design methods including choice of materials, location and type of services, and attention to access) and which would apply to all work for which a building consent is required, including post-event works (see also comments on BA in section 6).

4.4.4 Other legislative improvements

The two now rather dated Acts - the Land Drainage Act and the Soil Conservation & Rivers Control Act - include residual powers and responsibilities relating to land drainage and a range of works and methods which are key components of flood risk reduction. As old legislation, these Acts lack clear purposes relating to flood risk management.

Options include providing new special purpose natural hazard risk reduction legislation that covers floods along with other natural hazards (UK and Scotland are currently considering consolidated flood risk management legislation in their Parliaments); expressing flood risk reduction as the purpose explicitly in modern language (See Appendix 2); and/or incorporating the two areas of responsibility within the LGA, where they could sit alongside other local government responsibilities[48]. These options would be complemented by a comprehensive definition of flood risk management activities that includes non-structural and well as structural flood risk reduction activities. The following definition was suggested to the Flood Risk Review[49]

Flood risk management activities - *include flood monitoring, forecasting and warning; consideration of climate change impacts; assessment of historical flooding information; construction, operation and maintenance of river and flood control schemes and coastal flooding works; construction, operation and maintenance of land drainage and stormwater management systems; river capacity surveys, floodplain aerial photos and ground level information, and risk mapping; river and floodplain hydraulic modelling; development of options for mitigation including relocation of buildings and services, flood proofing, retreat, planning rules, targeted rating; resource material for public awareness and action relating to flood risk; development of regional plans and rules at regional and territorial local government level for managing floodplain development.*

[47] If section 72 was modified, section 71 would probably remain as it is currently worded.

[48] It is acknowledged that wastewater and water supply responsibilities are focussed on asset provision and management in the LGA at present, whereas flood risk management would encompass assets and also responsibilities that reach out further into private land.

[49] PSConsulting and David Hamilton and Associates, (2007). *Flood Risk Review - funding, roles and responsibilities*. Prepared for Ministry for the Environment as part of the Flood Risk Review, June 2007.

If the LDA and SC&RC Act functions were included within the LGA as core local government activities, a consequential amendment would have to be made to section 9(a) of the Local Government (Rating) Act 2002-Non-rateable land liable for certain rates, to include flood risk management activities for the purpose of setting targeted rates. This would have the effect of enabling S9 to apply to flood risk management services for rating purposes and thus address some affordability issues for less well endowed councils.

The Flood Risk Review also identified issues in understanding and monitoring local authority expenditure on flood hazard planning and management. Unlike other assets and functions which are separately covered in the LGA, flood risk management, drainage activity and river control, and planning for flood risk reduction is not specifically identified. It is therefore reported in a relatively inconsistent manner, or is not transparent at all, in LTCCPs. This issue is part of a larger issue of LTCCP reporting, beyond the scope of this report. However, the suggestion in Option 14 below would assist in highlighting this aspect of council activity.

It would also enable and encourage more transparency in terms of local government financial planning and accounting for flood risk management.

Option 12 Consolidate the relevant parts of the LDA, the SC&RC Act, and the Environment Act into a natural hazards risk reduction (including floods) statute that incorporates a comprehensive definition of flood risk management activities (non-structural and structural). (Note that this option implies a new agency would probably need to be formed, as outlined in Option 35).

Option 13 Incorporate a clear flood risk reduction purpose within the LDA and the SC & RC Act, and add power under the SC & RC Act to undertake non-structural flood risk reduction action.

Option 14 Merge the roles and responsibilities currently under the LDA and the SC & RC Act and amended to define flood risk management activities to include non-structural approaches, within the LGA (and a consequential amendment to the Local Government (Rating) Act 2002).

Option 15 Require separate and standardised LTCCP reporting on financial provisions for flood risk reduction planning, asset management, and other provisions. (This could be achieved by clarification in the LGA 10th Schedule.)

4.4.5 Financing planning activity

As noted earlier, some councils with low rate bases and flood issues, lack the resources to actively plan for flood risk reduction. Statutory planning processes in particular can be expensive. Examples of such areas are the South Island west coast, South Taranaki, and possibly Northland and Gisborne. A range of support mechanisms (one-off grants ,Crown landowner beneficiary and rate contributions) should be considered.

Option 16 Provide financial support for planning for under-resourced communities which is based on ability to pay (council income based approach) and consider further the Crown contributing as a landowner beneficiary of services that reduce flood risk

4.4.6 Practice aspects

Practice through regional and district plans is, as identified earlier, quite patchy and some areas exposed to relatively frequent flooding or high risk of flooding have no specific planning framework. In other areas, a range of techniques has been applied, and this experience can assist other local authorities.

In addition, the increase in flood events globally has driven international development of planned approaches to limiting flood hazard exposure. New Zealand organisations can learn from countries with a similar organisational and regulatory approach – particularly UK[50], Australia and some European countries. Ideas which relate to pre-planning for future events, including land use planning, have also been promoted[51].

A mix of methods is included below to stimulate planning to reduce flood risk, including the dissemination of current best practice ideas.

Option 17 The NPS should include more emphasis on including the following points: local authorities should undertake pre-planning, and should have objectives, policies and where practicable, rules to ensure that opportunities are taken up at recovery stage to reduce risk (i.e. retrofitting for reduced flood exposure)

- the overall objective is flood risk reduction, and there are many planning actions that can contribute to that
- effective flood risk reduction requires co-ordination between local government levels and with central government and utilities
- asset management and maintenance and planning for flood risk reduction commensurate with a community's needs should also be reflected in the council's LTCCP.

Option 18 MfE to develop and promote a series of best practice guidance notes, or other actions, to encourage innovation and dissemination of best practice in planning activities for flood risk reduction.

Option 19 MfE/Ministry of CDEM to lead a local government forum to encourage best practice in active management and planning ahead for flood risk reduction.

Option 20 MfE to develop and apply a framework for monitoring the effectiveness of planning actions, and planning responsiveness to flood events.

[50] See suggestions for example, in the Pitt Review, ibid.

[51] "Pre-event recovery planning for land-use in New Zealand: An updated methodology", GNS 2008.

5 Readiness and response

5.1 Introduction

Section 4.2 above sets out a model framework for linking the "4Rs" together with feedback from flood events to planning actions, by learning from the experience of flood events. This is also consistent with the risk management approach set out in the NZ Standard 9401:2008 *Managing Flood Risk- a process standard*. Using such a framework, there are opportunities for risk reduction to be better integrated into readiness and response activities and thus strengthen resilience of communities over time.

As noted in section 2.1, the Goals of the CDEM Strategy include;

- To reduce the risks from hazards to New Zealand and
- To enhance New Zealand's capability to manage emergencies and
- To enhance New Zealand's capability to recover from disasters.

These are the goals that drive the operational part of disaster response set out in the National CDEM Plan, from all hazards including flooding. The guide to the implementation of the Plan sets out the procedural arrangements.

It is noted that the Guide to the National CDEM Plan has sections only covering readiness, response and recovery. It makes only a few references to risk reduction in those sections, but with no guide as to how this might be done or a cross reference to where this might be spelt out. The emphasis in the Guide and the companion Recovery Management Guide is on operational and process aspects of emergency response. The Guide could be amended to raise the profile of reduction activities that could be undertaken at the readiness and response stages.

Local CDEM Groups are encouraged when preparing for emergencies to undertake hazard and risk management that;

- avoids and reduces risks as much as practicable
- enables the consequences of the hazard event to be managed in a coordinated and efficient manner
- minimises the risks of escalating or secondary consequences arising from the event;
- makes use of opportunities to mitigate ongoing risk during recovery.

However, the links to risk reduction responsibilities of local government under the RMA, the BA and the SC & RC Act are not developed in these guides.

An additional section in the Guide and possible revision of the National CDEM Plan, setting out the methods that could be used to reduce the risks at the readiness and response stages, would strengthen the links with reduction options developed by local authorities under the RMA and SC&RC Act in particular.

At the response stage consideration could be given to adding reduction options for communities in the public information that goes out at the time of the emergency. This would also have the effect of letting people know that they can have some control over the impact of the event on their person and property at the time of a flood, thus empowering them to take action.

Option 21 Add an additional section to the National CDEM Guide on Reduction actions that could be initiated at the Readiness and Response stages of flood emergencies, including tasking local CDEM groups to identify and encourage implementation of risk reduction opportunities prior to and/or immediately following a flood emergency.

Option 22 Provide public information on opportunities to reduce flood risk to communities at the response stage.

6 Recovery

6.1 Pre-event recovery planning

Planning to avoid recurring consequences of flooding is a key part of recovery. One of the objectives of the recovery stage in the Guide to the National CDEM Plan is;

"to restore as quickly as possible the quality of life of those affected so that they are able to continue functioning as part of the wider community".

This objective may be in tension with the desirability of undertaking flood risk reduction actions at the time of recovery. Any delay involving additional decisions, for example to raise or retrofit buildings or to modify or improve design standards for infrastructure, and any additional consent processes, may not assist with immediate recovery, rather it is focused on sustainable recovery for the longer term.

However, making provision for risk reduction at the time of recovery is consistent with flood risk reduction for repeat events or with action through the RMA statutory processes by way of plan review after an event, or in anticipation of known risk in event of a flood. In addition, "pre-planning" that seamlessly facilitates (and provides financial resources for) improved risk reduction in relation to the next event, is very desirable and likely to be most effective. Experience shows that action is more likely while the event is fresh in the minds of communities and agencies. Flood risk reduction is often not a priority after time has passed after an event.

6.2 Physical recovery and Building Act issues

As noted above, at the recovery stage the focus is on getting communities functioning again as quickly as possible. Having provisions within the BA which allows buildings and infrastructure assets to be replaced "like with like"[52] means that there is not an opportunity to assess whether those buildings or infrastructure could be flood proofed in a range of ways, or moved somewhere else to reduce future flood exposure. Similarly, structures which may exacerbate flood risk or flood effects are able to be reinstated without consent. With pre-planning, they could be designed to be reinstated in a way that functions in higher flood risk situations and thus to reduce the risk.

There is an opportunity to address this by direct statutory change involving extending the permissive elements of section 112 of the BA, to encompass flood improvements, and clarifying the First Schedule to ensure that unsuitable "like with like" reinstatement cannot take place.

Also as indicated above, a community could pre-plan for such reduction measures by having information readily available on the options for building owners, identifying areas where buildings could be moved to and other actions to improve long-term resilience so such actions could be taken quickly following a flood event and insurance products could be developed as a market response to the pre-planning and claims made at the recovery time for flood proofing.

Consequential to this option is the opportunity to amend the Adverse Events Rural Assistance programme to ensure replacement of "like with like" does not result in ongoing flood risk generated by under designed culverts and bridges for example in rural areas which can exacerbate risk and hazards downstream.

To demonstrate both the practicability and effectiveness of pre-planning, one or more pilot projects could be carried in communities known to be subject to flooding. This would require cross-agency effort and joint funding (see section 7), and the application of a range of techniques to, for example, identify and apply a range of flood-proofing methods on existing buildings, review access and refuge areas, modify drainage systems, and put in place (if necessary) triggers for retreat.

[52] While there have been considerable changes to the First Schedule, and guidance clarification by the Department of Building and Housing, it seems that local authorities probably have a range of interpretations of whether consents are needed to reinstate buildings following floods. Generally if there has been any hint of structural damage, a consent is needed.

Option 23 Central Government through MfE and Ministry of CDEM to jointly develop and promulgate "best practice" advice for local government to pre-plan for retreat, relocation or other methods, for building owners to flood-proof buildings, and to encourage CDEM groups to have a pro-active role in such action.

Option 24 Central Government to fund one or more pilot projects in pre-planning to improve physical aspects of local flood resilience, in partnership with local governments, civil society and insurance agencies.

Option 25 Amend section 112 of the BA to encompass flood risk reduction, and the First Schedule to the BA to exclude any ability for buildings/structures damaged by flooding to be reinstated without consent (unless such repairs are minor, do not exacerbate flood risk and comply with provisions developed and agreed as part of a local pre-planning exercise which the territorial local authority has been party to).

Option 26 Amend the Adverse Events Rural Assistance policy to include an extra check that is made to avoid replacing "like with like" structures or buildings where it may exacerbate on site or downstream risk of flood hazard.

6.3 A new role for the Earthquake Commission?

The Flood Risk Review noted the need for an enhanced role for the insurance sector, variable levels of private insurance and the role of the EQC scheme as a partial financial contributor in terms of recovery.

A recent paper (Middleton, NZEQC, 2008) advocates a range of actions that would help recovery and at the same time reduce future risk. These include:

1. Clarification of reoccupation processes after a dwelling has been certified as un-occupiable under the BA (currently it is the householder's responsibility to organise certification by a suitable expert), and clarification of minimum acceptable requirements for reoccupation.
2. Addressing shortcomings inherent in insurance as a recovery tool, and the situation of those who are uninsured.
3. Facilitating the carrying out of temporary or urgent repairs that enable reoccupation of damaged dwellings (identified as outside the scope of any agency's responsibilities).
4. A review of the Earthquake Commission Act 1993 (EQC Act) and a broadening of its scope to include all natural hazard causes (including flooding), but to support only those whose homes have been rendered "unsafe or unsanitary" (to key into local authority responsibilities already defined in the BA).
5. This new scheme to be aimed at practical and financial aspects of recovery under the auspices of a revamped, renamed EQC (Natural Disaster Commission).
6. Assigning a role to an agency to resource urgent residential habitability assessment (i.e. whether a house is still safe and sanitary after a disaster) and temporary repairs, with a clear specification of this role and its boundaries.

Currently, the EQC Act is built around the type of hazard, rather than the consequences of any hazard. This has historical origins and limits the extent to which one agency can seamlessly manage people in need. A number of agencies are involved in recovery, with no one agency responsible for community recovery. This also limits the ability to get people quickly back into their homes. EQC in practice deals with all damage covered by the Act in event of a disaster, thus generating a great number of small claims.

If EQC was given the overall responsibility to manage the recovery process with respect to getting dwellings habitable and coordinating the range of assistance, the objective of quick recovery would be achieved more readily and the chances that a risk reduction approach is taken could be enhanced. Such an approach would be quite consistent with the original public good purpose of the EQC Act when it was originally set up. It was subsequently modified to limit cover to residential situations only, with other damage being covered by the private insurance sector. Commercial and

industrial property owners were expected to have insurance and the resources to manage in a disaster..

However, there is a case to be made for a change to EQC cover that is based on natural disaster claims that cover habitability, but in all hazard situations, rather than all losses in some hazard situations. It is understood that the fiscal effect would be almost the same to the Crown accounts[53], compared with the current system. In this context the EQC could be the coordinator of the recovery process to get people back into their dwellings quickly (by undertaking urgent inspections and repairs and thus making homes habitable more quickly) and manage the recovery process for those evacuated for longer periods, where there is currently a gap. This contrasts with the situation at present, where after the initial response period people are on their own to initiate the necessary steps for recovery where homes might be repairable but are temporarily uninhabitable. This could also have the added advantage of enabling risk reduction actions to be incorporated into the recovery process more easily as one agency would be at the interface with affected people and directly with local government with respect to the BA.

The following options would require amendments to the EQC Act.

Option 27 Broaden the scope of EQC to include all causes (including flooding), but to support only those whose homes have been rendered "unsafe or unsanitary".

Option 28 Change the role of EQC to enable it to carry out urgent inspections and repairs so people can get back into their houses quickly and to enable it to manage the recovery process for those evacuated for longer time periods and thus facilitate community recovery in a proactive way.

Option 29 Enable the EQC to cover flood proofing improvements and re-siting of some affected buildings

6.4 Private insurance

Consideration needs to be given to what role the private insurance industry might play in encouraging a risk reduction approach to flood risk management. The insurance industry covers the house and contents components of assets damaged by flooding, if the assets are insured for fire.

Insurance companies will pull out of insuring assets in flood risk areas if they are losing money, for example where properties have experienced repeat flood events. However, there have been examples where insurers have set terms and conditions like increased excess payable in flood risk areas, after they have funded flood risk assessments in conjunction with councils, to more specifically identify areas at risk from repeat flooding. This approach has kept their business and reduced their exposure to risk. This gives insurers the opportunity to respond in their own terms to the management of risk. The co-funding of flood risk assessments between local government and insurers is not however generally supported by the insurance industry.

Another approach which would create an incentive for the insurance industry to design products that encourage risk reduction is where councils require flood risk reducing measures, such as flood proofing by raising floors and services above flood levels. This could encourage insurance companies to create new policies that enable such "betterment" to be covered. If a council had a requirement, that if a building was damaged by more than 50% of the value, for example, it would not get a permit to rebuild, then an insurer could design a product that covered the total loss of the sum insured. This approach would involve a local authority regulation creating a commercial demand for a risk reduction product for which the insured would pay a new premium reflecting the potential loss.

[53] Pers. Com. David Middleton CEO EQC

Currently under the EQCAct and most private insurance policies, "betterment" is excluded from the claim payment. This encourages replacement of "like with like" and thus prolongs the flood risk. There are however some situations where if the cost is the same to replace, for example electricity sockets above the flood level on rebuilding, then the payout can be used for that purpose, if of course the insured knows about the option of doing that. This is where information dissemination about the options becomes important at the recovery stage and is another role that EQC could undertake if its Act were to be changed as suggested in 6.3 above.

Central government could take a more proactive role in encouraging insurance companies to look for opportunities with local government to design new products that could enable flood proofing and re-siting activities to be covered by insurance.

The British government has entered into an agreement with the UK flood insurers as a way of drawing attention to flood risk and their respective roles in reducing flood risk exposure while maintaining insurance cover[54]. A similar agreement could be developed in New Zealand to enhance collaboration between central and local government and the insurance industry. This could be extended to encourage sharing of information on flood risk to ensure that insurance products more closely reflect flood risk.

Option 30 Explore the development of a government/insurance industry agreement to raise the awareness of insurance companies to the opportunities to create new products that better reflect the flood risk and that cover retrofitting flood proofing actions and re-siting of buildings after a flood event.

6.5 Feedback loops into the planning system

At present the links between the emergency readiness, response and recovery stages, and planning action by local government are not clearly set out for action at the time of an emergency. There are a number of ways the planning system could be flagged during the recovery stage of flood emergencies, which could require actions by both central and local government.

Plan changes under the RMA could be required to be initiated as a result of flood risk being identified by an event, and could then cover the specific land use provisions, and building and infrastructure provisions, including retreat from flood risk areas, subdivision and building provisions and acquisition of land for relocation of at-risk land uses. Options to address this aspect are dealt with above in Section 4.

An additional approach could be to task CDEM groups more specifically to identify the opportunities for plan changes. The need for such changes would be most obvious immediately after an event, rather than waiting until the effects have subsided and memories of risk and hazards have dimmed. This would require an amendment to the National CDEM Plan and Guide.

Option 31 The NPS should require plan reviews following flood events within a specified time. If councils decide not to initiate plan changes they could be required to report on their reasons to MfE.

Option 32 Amend the national CDEM Plan and Guide to task CDEM groups specifically to identify opportunities for plan changes when recovery is underway and forward these to the responsible council for action.

These options would provide the necessary feedback to support the earlier options covering RMA amendments, NPS enhancements and guidance on best practice planning methods of flood risk reduction. By providing a feedback to the planning system the "4Rs" could operate more seamlessly and enhance interagency integration.

[54] ABI/Government Statement on Flooding and Insurance for England July 2008

7 Institutional issues

7.1 Current situation

Currently, there a large number of organisations with policy and regulatory roles at central and local government that have responsibilities for flood risk management. Flood risk management institutions operate with quite specific mandates under different statutes. Some have several mandates in different statutes which are not all aligned due to their having been drafted at different times and for different purposes.

The integrity and effective working of the flood risk management system in New Zealand thus relies heavily on good communications between agencies and information on flood risk, and on exchange of information within communities during and between flood events. On top of this comes the requirement to consider the effects of climate change on flood risk exposure and thus to plan with such risks in mind for the longer term.

In practice, the current system is heavily skewed towards response to large events, especially from central government. While local government has most of the legislation and tools available to it to undertake flood risk reduction across the full spectrum of structural and non-structural planning tools to reduce flood risk, the latter are not as well developed and applied in practice as they could be. This seems to be related to a combination of things including, capability and resourcing issues through to development pressures on council decisions and reluctance to stymie new or intensified developments in flood prone areas, and a lack of clear central guidance in legislation, or in a practical form that gives them confidence to act.

In addition to options that might address the reasons for this situation, there may be opportunities to address the design of the institutions that have flood risk management responsibilities, to see whether other configurations could bring about better co-ordination across the range of functions. Resourcing of some agencies is also raised.

7.2 Possible institutional remedies

There are a number of options that could be considered to provide better institutional design or better ways of linking the activities of hazard management and policy agencies that manage flood risk.

7.2.1 Greater central government capability, direction and monitoring

The overarching leadership role for hazard management in New Zealand could be strengthened in the MfE to support the current advisory functions. This would be a matter of priority and resourcing to increase the Ministry's capacity in the hazards management area and for the administration of national instruments on flood risk management and climate change adaptation. This would support the stronger direction in such instruments as recommended in this report and more consistent guidance to regional councils operating under the SC&RC Act.

The alternative to strengthening MfE functions would be to transfer the functions for flood and other hazard risk management to another existing agency, for example, MCDEM and hence change the central government department responsible for hazard management (including floods). This would require amendment to the Environment Act, the SC&RC Act, and the LDA to change the responsible agency and clarify any residual roles.

A national hazards data and information repository could be set up at the MfE or other existing agency, to enhance these functions. Such a repository could provide the framework and standards for collection of flood risk information (including the extent of flood risk, and consequences of past events, including observations of flood depth and velocity and flood damage costs; along with projections of future flood risk, hydrological predictions, other assumptions made, and the results of hydrological modelling). Some work has begun on collecting some of this information via the Riskscape project funded by the Foundation for Research Science and Technology. However, it is

desirable that such a repository be held by the responsible government agency, with provision for keeping it updated and secure over time rather than through a short term research programme.

The information could also be used by other agencies and interested parties to monitor the implementation of hazards risk reduction, including floods. A requirement on local government to prepare information in their LTCCPs in a consistent manner and to prepare flood risk assessments (see earlier discussion in 4.3.4, Options 3, 14 and 19, and 7.2.4 and Options 32, 33 and 34 below) would enhance the ability of central government to monitor the effectiveness of hazards risk reduction.

The consistent call for greater central government leadership on flood risk management needs to be underpinned with adequate capability in the administering agency. Greater central government capability, direction and monitoring would provide that in a more robust way.

7.2.2 A new agency

Another approach could be set up a new agency by taking the hazards management functions, including related climate change adaptation and the associated capability from MfE (suitably enhanced as suggested in 7.2.1 above), and place it with the emergency management role for flood risk at the MCDEM as a risk reduction unit for all hazards. This would require legislative change to the Environment Act, the SC&RC Act and the LDA. Alternatively it could administer the amendment to and consolidation of hazards management into one statute. See Option 12.

The hazard data and information repository management function could be given to the new agency as set out in 7.2.1 and it could monitor the activities of hazards risk reduction and collect information on the costs of hazard management, so it is in one place and accessible for effectiveness monitoring. Currently the central government information on flood damage costs of floods is spread across several agencies and not managed in a consistent and consolidated way. This makes it difficult to judge effectiveness of expenditure after flood events and whether the investment is exacerbating flood risk or reducing flood risk. The local government companion option to a national repository of flood risk and damage costs information is to assist local RMA planning and BA administration processes, enable the public to have immediate access to such information, and to improve the manner in which local government agencies manage and present their flood risk reduction investment information. Refer Options 3 and 15 above.

The new organisation could become a Natural Hazards and Disaster Management Agency with policy, regulatory and operational functions.

This could also include, or not, an amended role for EQC as set out in 6.3 above. Refer Options 27, 28 and 29 above.

The alternative to having the EQC function included in the new agency, would be to make the changes to the EQC role by amending the EQC Act and retaining it as a separate agency.

7.2.3 An EPA

There have been suggestions that the regulatory function under the RMA could be strengthened by moving the NPS and NES role from MfE and adding it to a revamped ERMA as an EPA. It is unclear what this would achieve for flood risk or other natural hazard management, other than perhaps more focus on a quicker NPS and NES process. The disadvantage would be that some RMA activity would be split from its responsible organisation with a resulting dilution of capability and thus effectiveness. With respect to hazards management, the enhancement option in 7.1.1 or the new agency option in 7.2.2 would be preferable as they would enhance the ability to promote and execute a hazard risk reduction approach across all natural hazards. An EPA option is not supported as a means of improving better integration of flood risk management.

Option 33 Strengthen the capability of MfE to lead flood risk management as part of its hazards management role.

Option 34 Strengthen the capability of another agency (e.g. MCDEM) to undertake the

central government role in natural hazards risk management (including floods) and amend the responsible agency in existing legislation.

Option 35 Set up a new agency by merging MfE hazard risk management functions with the emergency management role at the MCDEM, including flooding and related climate change adaptation (this could include or not the next option in the one organisation) called the Natural Hazards and Disaster Management Agency. (See also Option 12, a consolidated natural hazards statute).

Option 36 Change the mandate of EQC as in Options 27, 28 and 29 by amending the EQC Act and retain it as a separate agency or merge with Option 35.

Option 37 Administer NPS and NES for flood risk management from within an EPA.

7.2.4 Hazards information

The Flood Risk Review identified the fact that hazards information was being supported to varying degrees of integrity by a large number of individual local government units. It was noted that there were no standards being applied nationally and there were varying degrees of accessibility of the information. In addition, there were resourcing issues. The larger better resourced local government agencies had more resources to apply to the problem than less well resourced agencies. Consequently, there is a patchy application of flood risk assessments across New Zealand, with the consequence that flood risk is higher than it otherwise could be.

There are two purposes for flood hazard information identified here - information for managing the flood hazards and information to monitor the effectiveness of the flood risk management actions or policy.

There are several ways that such information and its accessibility could be improved;

- Develop a coordinated and standardised approach to the collection, storage, maintenance and accessibility of flood risk and flood damage cost information which could apply to central and local government information wherever it is kept. The NZ Geospatial Strategy could provide the framework for this and the repository held by whichever agency is responsible for flood risk management. See Option 38.
- Require local government to adopt standardised categories for their funding of flood risk management activities (as defined in section 4.4.4 above) through the LTCCPs by way of an amendment to the LGA Schedules. The Flood Risk Review found it extremely difficult to compare the expenditure on flood risk management across the different local councils, as they were included in different categories across the same areas of activity. See Option 39.

7.2.5 Conclusion on institutions and national information

Strengthening hazards management capability at central government that is also better linked to the disaster response and recovery operations is essential for reducing flood risk in New Zealand. Whether this is done by the strengthening Options set out in this report above or by changing institutional arrangements depends to a large extent on the signals the government wishes to give and the resources available.

Institutional change (Option 35 with the national natural hazards data and information repository in Option 38) is potentially the best option to get improved coordination and leadership on flood risk management in New Zealand. There would be some transitional costs in the short term that would be balanced by the benefits of better coordination and improved standards and coverage of natural hazards data and information, with eventual reduction in flood risk and damage costs.

Option 38 Set up a national natural hazards data and information repository at MfE or other central government agency and set a framework and standards for data collection, storage, maintenance and accessibility (possibly through the

Geospatial Strategy) and monitor hazard risk reduction and the implementation of the policy and actions (the information repository would be in addition to Option 3).

Option 39 A requirement in the LGA for LTCCP information to be provided in a consistent manner across all councils (this is complementary to Option 15 but broader, in that it would apply to all local government activity types).

Option 40 Require councils to prepare hazard assessments within a specified timeframe within the NPS.

7.3 Collaboration mechanisms

We have been asked to report on possible collaboration mechanisms for getting better engagement on flood risk reduction across responsible agencies at central and local government and with the private sector. The institutional options explored above, provide institutional reform and redesign. Other options include a range of collaborative mechanisms to effect behaviour change in organisations by using management and governance approaches.

7.3.1 MOU between agencies

There is some experience with using MOUs to determine the shared responsibilities between units of local government under the SC&RC Act and the Land Drainage Act. Triennial agreements are used between regional and district council levels to give high level agreement over budgeting, sharing of information, staff collaboration and general working relationships. By and large these are successful where there is a good working relationship already. These arrangements are usually very reliant on personalities in organisations. To our knowledge there has been no review of the success or otherwise of such mechanisms for the purpose of multi-agencies collaborating when there is no single clear legislation for managing resources.

There has been recent experience between two agencies with an MOU for specifying agency roles and responsibilities. However, the one we are aware of between MfE and MAF is for a defined project with a beginning and an end and deals in the main with shared funding for two similar projects. It is not an agreement around ongoing responsibilities for resource management that is set out in different statutes. The experience with such an MOU was that the transaction costs of drafting and getting agreement on the MOU, outweighed the benefits, where there were already good working relationships. There is also some doubt whether such agreements are legally binding when legislative mandates underpinning the responsibilities are somewhat unclear. It is better to address the mandates, rather than use an instrument to force collaboration or integration.

Other experience with the use of MOUs at local government level indicates that they break down easily under pressure, and more time and effort is spent rebuilding relationships within a MOU, than with facilitating informal relationships. This experience is based on a limited sample, but is nevertheless authentic.

7.3.2 Shared objectives in Statement of Intent

There is some NZ central government experience with shared SOI objectives that took place during the 1990s. Once again different organisational purpose tended to strain such shared objectives, unless they were underpinned by a cross-government strategy that had Cabinet approval. Even with such approval such strategies do not always endure (see 7.3.3 below). The same down-sides exist for shared SOIs as for MOUs above

7.3.3 Cross-government strategies

Cross-government strategies have become more common place since 2000. However, several quite high level ones have languished as policy priorities have changed over time e.g. biodiversity strategy, Terawhiti whole-of-government development strategy. Their effective implementation again relies on willing participants at all levels of government and when priorities change, strategies

become redundant and the driving force for them is lost. However of the options above, cross government strategies do have greater moral suasion than MOUs and shared SOIs and could be seen as necessary but not sufficient in signalling a priority and helping with agency integration.

A simple cross government strategy on flood risk reduction could be prepared using the Flood Risk Review findings which were agreed across government and including the preferred package of options in this report as the Action Plan. To achieve stronger linkages between the flood risk reduction strategy and the National CDEM Strategy, specific links could be made in both and be supported by administrative arrangements in management of the "4Rs" (see 7.3.4 below).

7.3.4 Cross government coordination arrangements

There are already in existence some cross government coordination mechanisms that are used in event of flood events and for other natural hazards where the impacts are of national significance and where there is a need for strategic mechanism for co-ordinating a whole-of-government response. The Domestic and External Security Co-ordination (DESC) mechanism is one such arrangement that supports Ministers through a group of officials chaired by a co-ordinator (the CEO of the Department of Prime Minister and Cabinet). This mechanism would kick in to support whatever institutional arrangements are used for flood risk management as set out in section 6 above.

The other example relevant to flood risk management, and in particular the management of national data and information on floods, is the Geospatial Network which has a similar structure to DESC. The NZ Geospatial Office is a co-ordinating body leading collaboration on public sector geospatial resources helping to ensure those resources can be readily discovered, appraised and accessed. It is supported by a governance arrangement that includes a Joint Ministerial Group, an Executives Group and an Advisory Group whose representatives come from central and local government agencies and Crown companies.

It is desirable that these existing arrangements be closely linked with and support the flood risk strategy and action plan outlined in 7.3.3 above.

7.3.5 Regulatory alignment and new organisations

The collaborative mechanisms above all rely heavily on organisational buy-in and shared or common purpose which by the very nature of government agencies under the State Sector Act is difficult to achieve, unless driven strongly by legislation or political direction/strategy. The latter usually follow the electoral cycle and as such are usually short term and not a sustainable platform from which to drive a risk reduction strategy for flood management that needs to be enduring over time.

Clarity of purpose shared by all agencies and spelt out clearly in all relevant legislation underpinned by cross government strategy and administrative arrangements are thus likely to be a better option for driving effective and integrated organisational behaviour. For example, new legislation or amendments to existing flood risk management legislation, and strengthening and clarification of roles and responsibilities, as suggested in other options.

Option 41 MOU between agencies to collaborate on flood risk reduction.

Option 42 Shared objectives in SOI's on flood risk management responsibilities.

Option 43 Prepare a cross government strategy on flood risk reduction based on the findings of the Flood Risk Review and include the preferred package of options from this report as the Action Plan.

Option 44 Ensure that the flood risk reduction strategy and actions are supported by the activities of DESC and the NZ Geospatial Office coordinating mechanisms.

8 Choosing options / priorities

8.1 How options have been assessed

The options consolidated from earlier in the report have been considered in terms of their likely effectiveness, benefits, costs, distribution of benefits, synergies with other outcomes and time to implement. As a result of this analysis a judgement has been made as to the priority of each option.

- *Effectiveness* is assessed in terms of the ability of the option by itself or with other options to improve the integration of flood risk management activities across responsible agencies and to reduce flood risk. Matters considered here include likely durability of the option; ability to elevate the priority given to flood risk reduction by central and local government; greater clarity of purpose around flood risk reduction; consistency and alignment across legislation; improvement in understanding of flood risk; improvement in the ground planning and flood risk management practice; reduction in risk of exacerbation of flood risk; improvement in flood risk recovery
- *Benefits* are assessed in terms of avoided damage and planning costs; better understanding of flood risk damage costs; improved community well-being; empowering communities to manage flood risk; increased community resilience; streamlined recovery process; improved flood risk reduction
- *Costs* are assessed in terms of costs of implementation both transitional and long term; transactions costs; increased costs for central and local government
- *Distribution of costs* is assessed in terms of who or which agencies receive the costs and benefits
- *Synergies* include effects on other agencies polices and their implementation
- *Time for implementation* sets out an estimate of the timeframe for implementing the option

A priority ranking has been given each option on the following basis;

- Priority 1 - high effectiveness, low cost and easy to implement
- Priority 2 - and effective and low cost but more complex to implement in terms of timeframe the process required to implement the option
- Priority 3 - not as effective, more costly and complex to implement

The options are grouped around the opportunity where an intervention could be made to better integrate flood risk management to reduce flood risk across New Zealand.

8.2 Listing of options

NPS

Option 1 The NPS to state that regional and district plans should take a precautionary approach in the absence of reliable information on flood hazard.

Option 2 The NPS to state that:

- inadequacy of information is not a reason for not planning to avoid or reduce flood hazard
- local authorities should use the best available information to identify areas at risk
- local authorities should continue to improve their information over time
- planning should take into account the effects of climate change[55] and other changes that could modify flood risk including expected "upstream" landuse changes that are anticipated and/or planned for.

[55] See section 4.3.3 of this report in relation to the timeframe for planning for flood hazard.

Option 3 The NPS to require local authorities (regional and district) to develop and maintain a publicly-available repository of information, on past and predicted flood information, including for predictions, information taken into account and assumptions made, and a commentary on reliability in terms of section 35(1), with or without a timetable. (See Option 32 a national repository of information and monitoring.)

RMA

Option 4 Add a new item to section 7 RMA to require specific consideration of flood hazard or flood risk exposure.

Option 5 Clarify the meaning of the effects of climate change in sections 2 and 3 RMA to encompass increased flood risk.

Option 6 Use the RMA instrument of a national environmental standard as a basis for planning (e.g., achieve a nationwide risk exposure from flooding of less than a specified AEP – e.g., 1% max).

Option 7 Use the RMA instrument of a NPS to provide a good level of direction to councils in terms of flood management by way of a planning timeframe and a risk based target (see also Options 1, 2 and 3).

Option 8 Provide territorial authorities with powers to cancel existing use rights (analogous to those provided for regional councils) where flood hazard is an issue. This would involve exceptions in terms of sections 9, 10 and 10B.

Building Act

Option 9 Add a provision to sections 3 or 4 of the BA which specifically refers to buildings being resistant or resilient to natural hazards (including the range of sources of flood risk).

Option 10 Reword section 72 as an option rather than a compulsion – i.e., change "must" to "may" – and add to (c) "or to apply additional or specific conditions to address special features of the land covered under section 35", or like wording.

Option 11 Consider and progress the introduction of a flood risk code, which would promote flood resilient buildings and apply to all work for which a building consent is required, including post-event works.

Other legislative changes

Option 12 Consolidate parts of the LDA, the SC&RC Act and the Environment Act into a new natural hazards risk reduction statute that includes a comprehensive definition of flood risk reduction activities.

Option 13 Incorporate a clear flood risk reduction purpose within the LDA and the SC & RC Acts, and add power under the SC & RC Act to undertake non-structural flood risk reduction action.

Option 14 Merge the roles and responsibilities currently under the LDA and the SC & RC Act and amended to define flood risk management activities to include non-structural approaches, within the LGA.

Option 15 Require separate and standardised LTCCP reporting on financial provisions for

flood risk reduction planning, asset management, and other provisions.

Funding for planning

Option 16 Provide financial support for planning under-resourced communities which is based on ability to pay (council income based approach) and consider further the Crown contributing as a landowner beneficiary of services that reduce flood risk.

Practice aspects

Option 17 NPS practice additions:

- local authorities should undertake pre-planning, and should have objectives, policies and where practicable, rules to ensure that opportunities are taken up at recovery stage to reduce risk (i.e., retrofitting for reduced flood exposure)
- effective flood risk reduction requires co-ordination between local government levels and with central government and utilities
- asset management and maintenance and planning for flood risk reduction commensurate with a community's needs should also be reflected in the council's LTCCP.

Option 18 MfE to develop and promote a series of best practice guidance notes, or other actions, to encourage innovation and dissemination of best practice in planning activities for flood risk reduction.

Option 19 MfE/Ministry of CDEM to lead a local government forum to encourage best practice in active management and planning ahead for flood risk reduction.

Option 20 MfE to provide a framework for monitoring the effectiveness of planning actions, and planning responsiveness to flood events.

Readiness and response

Option 21 Add an additional section to the National CDEM Guide on Reduction actions that could be initiated at the readiness and response stages of flood emergencies

Option 22 Provide public information on flood risk to communities at the response stage

Recovery BA issues

Option 23 Central Government through MfE and Ministry of CDEM to jointly develop and promulgate "best practice" advice for local government to pre-plan for retreat, relocation or other methods, for building owners to flood-proof buildings, and to encourage CDEM groups to have a pro-active role in such action.

Option 24 Central Government to fund one or more pilot projects in pre-planning for flood proofing and retreat, in partnership with local governments, civil society and insurance agencies.

Option 25 Amend section 112 of the BA to encompass flood risk reduction, and the First Schedule to the BA to exclude any ability for buildings/structures damaged by flooding to be reinstated without consent (unless specific circumstances apply).

Option 26 Amend the Adverse Events Rural Assistance policy to include an extra check that is made to avoid replacing "like-with-like" where it may exacerbate on site or downstream risk of flood hazard.

Recovery EQC

Option 27 Change the basis of the EQC cover to a disastrous cover for total loss only, for all hazards.

Option 28 Change the role of EQC to management of community recovery in a seamless way.

Option 29 Enable the EQC to cover flood proofing improvements for claims made after flood events.

Recovery private insurance

Option 30 A government/industry agreement to raise the awareness of insurance companies to the opportunities to create new products that cover retrofitting flood proofing actions after a flood event.

Recovery planning links

Option 31 The NPS should require plan reviews following flood events within a specified time. If councils decide not to initiate plan changes they could be required to report on their reasons to MfE.

Option 32 Amend the national CDEM Plan and Guide to task CDEM groups specifically to identify opportunities for plan changes when recovery is underway and forward these to the responsible council for action.

Institutional remedies

Option 33 Strengthen the MfE capability to lead flood risk management as part of its hazards management role.

Option 34 Strengthen the capability of another existing agency to undertake the central government role in natural hazards risk management (including floods) and amend the responsible agency in existing legislation.

Option 35 A new agency by merging MfE hazard risk management functions with the emergency management role at the MCDEM including flooding and related climate change adaptation (this could include or not the next option in the one organisation) called the National Hazards and Disaster Management Agency.

Option 36 Change the mandate of the EQC Act to change the mandate of EQC to all hazards and total loss and to manage a seamless recovery operation.

Option 37 Administer NPS and NES for flood risk management from within an EPA.

Hazard assessment

Option 38 Set up a hazards data and information repository at MfE and monitor the implementation of hazard risk reduction.

Option 39 A requirement in the LGAct for LTCCP information to be provided in a consistent manner across all councils (this is complementary to Option 15).

Option 40 Require councils to prepare hazard assessments within a specified timeframe.

Collaboration mechanisms

Option 41 MOU between agencies to collaborate on flood risk reduction.

Option 42 Shared objectives in SOI's on flood risk management responsibilities.

Option 43 Prepare a cross government strategy on flood risk reduction based on the findings of the Flood Risk Review and include the preferred package of options from this report as the Action Plan.

Option 44 Ensure that the flood risk reduction strategy and actions are supported by the activities of DESC and the NZ Geospatial Office coordinating mechanisms.

8.3 Analysis of options

The options have been analysed in terms of the considerations set out in 8.1 above, and a priority ranking for each option determined. A summary of the analysis is included as Appendix 3.

The recommended package is derived from this analysis, and is set out in the next section.

9 Recommended package

9.1 Introduction

We are drawn to the conclusion that the preferred approach to provide better integration and collaboration across flood risk management agencies, and better overall performance in flood risk reduction, would require alignment changes and consolidation across hazard management legislation, greater national direction through a NPS, and stronger leadership and capability in the responsible central government agencies, including potential change to institutional arrangements[56], to support flood risk management and practice guidance. This means that several options in a package are required.

The preferred options are those with a priority 1 and 2 as set out in Table 1, and below, where they are grouped around the "4R" stages and where there is an opportunity and a need for an intervention. Priority 3 options are not recommended as part of the preferred package. Institutional and funding priorities to support the "4Rs" are set out.

Planning for flood risk reduction

- An NPS precautionary principle; information assessment; local government repository of information; and target date for hazard assessment (refer Appendix 2 for detailed suggestions for content) [1]
- RMAct amendments - define effects of climate change to include flood risk; review existing use rights (TLAs) [1]
- Building Act amendments- S3 and 4 resistant and resilient buildings; S72 "may" and new wording [1]
- Building Code amendments- BC flood risk and flood resilient buildings new E part [2]
- SC&RCAct/LDA and LGA amendments- FRR purpose; consistent LTCCP reporting (Schedule 10) [1]
- Merge SC&RC Act (with amendments) with LGA [2]
- Consolidate all natural hazards related legislation into a new Act [2][57]
- Guidance and practice notes; monitoring of effectiveness of practice; pilot projects [1]
- Local government forum [1]
- MfE monitoring framework [1]
- Flood events drive plan reviews [1]

Readiness and response

- CDEM guide revision - add reduction section and task CDEM groups to identify opportunities for planning to avoid future risk [1]
- Information on flood risk reduction to communities [1]

Recovery

- Best practice advice on pre-planning, relocation, flood-proofing [1]
- Building Act consents (like-with-like) [1]
- Adverse Events Rural Assistance policy alignment (like-with-like) [1]
- Pilot projects for integrating planning and flood proofing and retreat [1]
- EQC cover change to total loss all hazards [2]
- EQC role change to community coordination [2]
- EQC to cover betterment [2]
- Private insurance cover for betterment [2]
- Amend CDEM Plan and Guide to enable flood events to drive plan review (CDEM groups) [1]

Institutional arrangements and coordination mechanisms

[56] Three options are suggested for consideration with varying degrees of complexity for implementation.
[57] But note this works best with a new agency, which is priority 2.

- MfE stronger capability and leadership of flood risk reduction with resourcing [1]
- Strengthen another government agency [2]
- EQC change mandate to cover change to habitability and all hazards, and coordination of disaster recovery role and undertaking of inspections and repairs[2]
- Merge MfE and MCDEM hazard management functions and create a new agency [2][58]
- National natural hazard data repository at central government agency complementary to LTCCP information produced to consistent format [1]
- Cross government strategy on flood risk reduction (pull together the FRR conclusions as a strategy and with the preferred package) [1]
- Use DESC and the NZ Geospatial Office coordinating mechanisms to support strategy [1]
- Local government forum [1]

Funding

- Financial support for communities with affordability issues (possibly 2 councils) [2]
- Seed funding of pilot projects to demonstrate flood proofing and retreat practice [1]

There are cost effective opportunities under each area above for better integration of flood risk management that would reduce flood risk over time across New Zealand. No one option is going to be effective by itself. The package approach should be adopted to maximise the opportunities to reduce flood risk. Only priority 1 and 2 are recommended for implementation.

9.2 Planning options

The planning options proposed would have the effect of providing the much needed national guidance for planning of flood risk at regional and local levels. Combined they would clarify intent and purpose, reduce legislative uncertainty and make flood risk information transparent to enable individual and community risk to be managed appropriately. Practice could be monitored effectively and damage costs reduced over time.

The need for clear central government guidance to local government on flood risk has been identified in the flood risk review and by local government interviewees for this project. The most effective way of doing this is for government to issue an NPS on flood risk management which has a clear statement of national significance which emphasises that flood risk reduction is the purpose of the NPS. The current draft does not do this. The preamble to the NPS could be used to indicate what is regarded as an acceptable level of risk given likely climate change impacts, and provide commentary in terms of some other aspects of policy and practice. This would not be prescriptive, but guide consideration at regional and local levels.

The NPS could be completed by 2010, and the amendments to the legislation included within the second stage of RMA amendments already signalled, and thus could be in force by 2010 as well. While this is on-going, the guidance material and pilot projects could be underway ready for completion by 2010, and subject to ongoing updating and review.

The Building Code amendments could build on the results of the initial stages of the pilot projects and be ready towards the end of 2010 which would give sufficient time for the necessary consultation. BA amendments could run in parallel.

Any consolidation of the SC&RC Act/LDA and LGA could be done with any other LGA amendments planned over the next few years. This is essentially a consolidation to enable flood risk management to be treated like waste water, for example, as a primary function of local government.

Any new hazards legislative consolidation could be done in conjunction with RMA changes over the next 12-18 months and would require sector consultation. The effect of this option would be to make hazard risk management very clear in statute and hence improve certainty about purpose across structural and non-structural (planning and building) activities See 9.5 below.

[58] We see some complexity in this institutional reorganisation, although if effectively done and accompanied by integrated legislation, this could be most effective.

9.3 Readiness and response

These would have the effect of linking the readiness and response stages better to the planning for flood risk reduction and be an effective mechanism for disseminating relevant guidance material to CDEM groups and wider communities.

The CDEM guide section on reduction could be prepared as part of current revisions being made and any consequential changes to the National CDEM Strategy. This could be completed in 2009. The information for at-risk flood communities on what they could do to reduce flood risk could also be prepared for use this year as part of the guidance material being prepared for CDEM groups. This could also give such groups the responsibility to identify planning opportunities for plan changes by councils.

9.4 Recovery

The effect of the priority 1 actions would reduce flood risk directly and make legislation used by local government clearer and thus easier and quicker to implement for reducing flood risk.

The priority 2 options would also have the effect of reducing risk directly and streamlining the recovery process. It would also align public and private insurance on the same basis and encourage flood risk reduction measures at the recovery stage and therefore reduce insurance risk overall. This is particularly important as flood risk is increased due to climate change effects.

9.5 Institutional and coordination mechanisms

Consideration was given to consolidation of all the flood hazard legislation in much the same way as is currently being done in the UK and Scotland following the Pitt Report. This would be a desirable thing to do to clarify the functions of agencies and their complementary activities and be effective in integrating agency actions across the “4Rs”. In the New Zealand context this would be best done for all hazards in conjunction with changes to the EQC mandate and strengthening of one agency in central government (e.g. MCDEM) to be the responsible agency across all “4Rs”.

There would be some costs to this option over a 12-18 month period but the benefits could be great for reducing the risks of flooding (and other hazards) that, after all, is the most common natural hazard event in New Zealand and will become more common and severe with climate change. Current estimated costs of flood events in New Zealand, is at least $250 million per annum.

The effect of the priority 1 options recommended would be to strengthen the ability of a central government agency (e.g. MCDEM) to provide the national leadership for flood risk management and with the preferred options for planning, readiness, response and recovery combine to provide more effective flood risk reduction delivery. The bringing together of a flood risk reduction strategy based on the FRR findings and this preferred package of options as an Action Plan would be a useful way of disseminating the intent of flood risk management to the wider players than those just involved in RMA NPS.

The suggested local government forum is supported by some players as being a good way of raising the importance of flood risk reduction and making links across the operational disciplines in local government, as well as kick-starting the practice guidance and dissemination. It is noted that this was also suggested by the FRR but not implemented due to a lukewarm response from some local government personnel. It is expected that if flood risk reduction is elevated in importance through the NPS, and the other options set out in this report are implemented, then there is likely to be a new interest in getting the forum operating. After all, floods are the most common and costly natural hazard that New Zealand experiences and they will only get more frequent and more intense with climate change.

The addition of the priority 2 option, of changes to the EQC mandate, would also serve to consolidate the priority 1 actions especially for the costly recovery stage. There would be one agency overseeing recovery with a consequent increase in community wellbeing.

These changes would be supported by existing cross government co-ordinating mechanisms such as DESC for disasters across New Zealand and the Geospatial Office for data and information co-ordination.

We do not consider that relationships between agencies need further formalisation – rather, a renewed effort around planning and the NPS, along with uptake of the preferred options should energise cross agency efforts.

9.6 Funding

The FRR and this report have identified some affordability issues in a few councils where there are high flood risks. It is recommended that a funding package be put together to enable these councils to improve their assessments of flood risk and to support their training and use of guidance material. The government should also look to contributing on the basis of landowner benefit as well in these areas where there is a large proportion of Crown land where rates are not struck.

This would have the effect of reducing flood damage costs nationally as well as regionally since central government often steps in after flood events in these areas.

Seed funding for pilot best practice projects would be a very good way of demonstrating flood proofing and retreat practice. This would give local government some practice before the legislation changes are in place and thus speed up the rate of implementation. Demonstration projects have proven effective in spreading innovations across a sector in other areas such as agriculture, for many years.

It is not clear whether a central government agency such as MfE or MCDEM would require additional funding to increase flood risk management capability or whether it is a priorities issue. This should be explored further to ensure that the capability is there to support flood risk management from the centre. The national natural hazards repository would require additional funding to build it up from existing information and then to add and maintain the repository.

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Appendix 1: Progress since flood risk review

- The new risk reduction goal has been disseminated by the Ministry of Civil Defence and Emergency Management (MCDEM) through its media campaign *"Get Ready Get Through"* and to the CDEM groups at local government level. Any wider dissemination as a flood risk reduction strategy has not yet been achieved due to resourcing issues
- A DIA training package for newly elected councillors and officials on hazards and risk
- GNS/NIWA courses on natural hazards management including managing extreme weather and flooding and managing coastal hazards. IPENZ courses for engineers on incorporating climate change into infrastructure planning and design including sea level rise and storm surge, stormwater and flood control, wastewater, water supply and storage/dam safety.
- A draft NPS is in preparation and submissions from stakeholders have been received. A draft NPS is expected to be published in 2009
- Guidance for local government on hazards including flooding and climate change has now been published and disseminated to practitioners including;
    - Hazards (including flooding) QP guidance note
    - Preparing for Climate Change –a guide for local government in NZ includes rainfall, flooding, coastal storm surges and waves, stormwater
    - Coastal Hazards and Climate Change - a guidance manual for local government, including changes to the frequency of storm surges and wave conditions.
- Funding was provided to the Met Service in 2007/08 to upgrade the rain radar coverage across New Zealand which will assist readiness, response and recovery during and after high rainfall events
- A central government-led forum to achieve good flood risk management practice has not yet been set up. Soundings from local government indicated that the purpose of the forum could be achieved through other local government practitioner fora. However, some central government agencies still see value in such a forum as a useful and effective way of sharing experience on flood risk reduction going forward and could feed into the required monitoring programme needed to gauge effectiveness of flood risk reduction activity.
- A monitoring framework for flood risk initiatives has not yet been developed. This could monitor the effectiveness of the flood risk reduction approach and associated activities, including the relative costs of the "4Rs" (a lack of information about which is impeding the ability to assess whether flood risk and the associated costs are increasing or not). The monitoring activity could have associated with it a data repository on all the costs that fall on central government associated with flood response. Currently these are not held in one place.
- The New Zealand Standard Managing Flood Risk P9401 has now been published and is being used by local authorities for high level guidance. It does not however address consistency in reduction approaches across New Zealand
- The Adverse Events Policy and Rural Assistance programme is in operation but has not yet been tested in a flood emergency
- Policy for uninsured and underinsured properties was considered. After discussions with the insurance industry and potential administering agencies a policy was not proceeded with because of uncertainties surrounding government agencies being agents for commercial insurance.
- Additional science funding for climate change adaptation/flood risk reduction to undertake the following;
    1. Research being funded by Ministry for the Environment to provide guidance on climate change implications for flooding. The research is in two parts;
        - The flow box - to help incorporate climate change impacts information into flow estimation. It is designed as a toolbox for engineers
        - The flow plan - to provide guidance on the incorporation of climate change impacts information into flood planning. It is designed mainly for planner and local government asset managers

       This research, due for completion by the end of the 2008/09 FY, is designed to enable basic climate change impacts information, e.g. rainfall, to be used in design of structures and systems and for planning.

2. Research being funded by FRST which will develop a modelling framework to examine changes in flood risk, river flows and soil conditions from climate change. The model will be developed within specific catchments that will be identified by researchers and a technical advisory group early in 2009. The information will be made available to land managers and end users, once the project has been completed at the end of 2009.

3. Research being funded through Envirolink includes;
   - A River Managers Handbook which will be a best practice guide for those managing rivers in regional and district councils. It will cover up to date assessment methods for flood hydrology, inundation modelling, sediment aggradation processes, ecological habitat and climate change in an integrated way. These will form the new river control management standards to minimise damage from flooding, siltation and erosion. Due for completion in 2009.
   - River cross section data analysis as a pilot project to collate and analyse historic and modern river cross section data and establish best practice for the storage and analysis of this data has been completed in 2008
   - A review of current practices for stream flow meter calibration is completed.
   - LIDAR information for assessing management of flood risk at Westport (a town with no flood protection) is completed
   - Isohyetal rainfall map for the Manawatu region and a subsequent spatial analysis tool that will allow rainfall data to be queried at 'farm scale' is completed.

- Ways of leveraging changes in insurance policies and increasing demand for new policy approaches will be considered as part of this report e.g. policy excess increases in flood prone areas; taking insurance money to resettle in another location; betterment policies to enable flood proofing when retrofitting flooded buildings
- Consideration of packages for retreat from areas flooded several times e.g. Kaeo is being considered and a generic approach on retreat will be considered as part of this report.

Appendix 2: Suggested draft changes, NPS, and minor legislation changes

The following suggestions expand on some of the options set out in the report. They are in draft form only and do not cover all options. The Option in this report to which they refer is also noted.

Suggested changes to the draft NPS on Flood Risk Management

Option 2, Option 7, Option 16

The Preamble should include additional brief commentary that covers the following information elements (indicative conceptual wording only).

- *Relating to information adequacy*
  It is recognised that flood hazard information will never be perfect. Information is sometimes costly to obtain, and because of the many variables involved, includes uncertainties that may be open to challenge. It is expected that local authorities will continue to improve their information about present and future flood risks, but will not delay or defer endeavours to reduce flood risk due to uncertainty about adequacy of information, or fear of challenge as to its adequacy. Similarly, decision-makers are expected to recognise and accept that decisions should be made on the best information available at the time, including reasonable assumptions and expert opinion.

- *Relating to flood risk reduction in existing areas*
  Many existing developed areas and elements of infrastructure are subject to existing flood hazards and/or residual flood risk. In these areas, it is expected that decision-makers will actively seek to reduce risk through setting in place methods which may include provisions, including where relevant, rules, in policy statements and plans which address the upgrading or retrofitting of existing physical resources to reduce flood risk to people and structures, which would have effect before or shortly after flood events. Active retreat from some areas may be necessary.

- *Relating to the need for co-ordination*
  Reducing flood risk involves many government and voluntary agencies. In consulting with local communities, and in formulating objectives, policies, rules and other methods to reduce flood risk, the knowledge, experience, roles and responsibilities of these agencies should be taken into account.

- *Relating to a Council's expenditure and accountability*
  The NPS recognises that local government agencies roles and responsibilities under the Local Government Act and other legislation are closely related to actions under the Resource Management Act. It is important that asset management and accounting are undertaken in a way that makes the different elements of flood hazard management and flood risk reduction transparent. LTCCPs should ideally report specifically on these aspects of local government activity.

- *Relating to planning time contexts*
  There is no single accepted level of protection from flood risk. However, a planning horizon of 100 years is considered the minimum appropriate for new residential buildings and significant infrastructure, or for flood-proofing of existing community assets. For coastal areas, rates of retreat for existing development may best involve monitoring and establishment of triggers for removal of existing assets. Where retreat from most-affected river flood areas is used as a method, it should take place within a precautionary timeframe, as flood events can take place at any time.

In clause 3, Interpretation:

Add to **flood risk management** the following:

- non-structural measures such as flood-proofing of building elements, use of innovative drainage systems and methods, setting floor levels, and locating accesses in ways that reduce exposure to flood waters
- managed retreat.

In clauses 4 and 5, modify the wording to make it clear that "flood risk reduction" is the matter of national significance rather than flood risk management, and the objective is "flood risk reduction by requiring flood risk management…".

Under the objective (5), a further bullet-point could be added to state:

- ensure flood risk management is directed towards the overall objective of flood risk reduction.

The matter of national significance (4) could be worded as *"…the reduction of risk from flooding so as to reduce and manage exposure of people and assets to flood hazards and their effects".*

(NB – the wording throughout the draft requires careful attention, as it is not particularly consistent. An additional item in clause 3 may be needed to explain what is meant by flood risk reduction – a comprehensive concept is needed.)

New Policy identifying flood hazard areas and undertaking flood risk assessments

Option 1, Option 2

In preparing assessments under Policy 7, and in formulating provisions to manage the effects of flooding, local authorities shall:

(i) recognise the probability of a rise in sea level and other consequences of climate change;
(ii) adopt a precautionary approach which makes reasonable allowance for elements of uncertainty in knowledge about the causes and effects of flooding in the area being evaluated, and the effects of changes in land use and development on flood risk within and beyond the area
(iii) take into account the most reliable available information on flood risk each time that Policies 7 and are implemented, including information from past flood events and the results of any modelling and/or predictions that have been undertaken
(iv) apply the methodology included in the NZ Flood Standard P9401: 2008, or replacement standard as appropriate.

(NB – Policy 7 separates flood hazard areas from residual risk areas. Policy 8 however refers only to managing the effects of flooding in flood hazard areas. We think that some planning for areas of residual risk is also desirable. Current wording of the draft NPS would not provide for this. The suggestions here for changed wording are based on the removal of the words "flood hazard areas" from the first sentence of Policy 8.

Option 3

Policy 2a:

(i) There shall be, in each region, an information base including, but not necessarily limited to, past and predicted flood information. Where the information relates to predictions, the assumptions taken into account and the level of reliability shall also be stated. The information shall be regularly updated and shall be available to the public.
(ii) Local authorities shall, as a priority, determine whether the regional council or each of the districts within the region, shall be responsible for establishing and maintaining the flood risk information base required in Policy 2a(i). Should this be determined to be the responsibility of a district council, the regional council shall ensure that the information is presented in an adequate and consistent way across the region.

Option 30

Add new Policy 9, as follows:
Following a flood event, relevant local authorities shall review plans and policies and undertake appropriate changes in accordance with Policies 7 and 8. Within six months of the event, each relevant local authority shall report to the Minister on the intended response under the RMA including an indicative timetable.

(In terms of Option 30, the latter part of the wording would be limited to require a report only if no action is intended to be taken.)

Option 38

Modify start of Policy 7 to state "Within X months/years local authorities shall:"

Resource Management Act – suggested changes

Option 4

New Section 7 item

(x) the need to reduce the exposure of people and natural and physical resources to the risk of flooding.

Option 5

Add a new definition in Section 5, as follows:

Effects of climate change include, but are not limited to, changes in temperatures and humidity, sea level rise, rainfall and wind intensity, average and extreme precipitation, flooding, rates of coastal erosion, occurrence of storm-related phenomena and extreme weather events and combinations of such effects, and subsequent changes in natural resources.

Add to Section 3 the following:

(g) the effects of climate change.

Option 8

Wording not provided. However, an exception could be added to Section 9(1)(b) to exclude activities within flood hazard areas identified in district plans (see draft NPS Policy 7 (i)). Similar exceptions would need to be made to Sections 10(1 a) and (b), and to 10B (3).

Building Act – suggested changes

Option 9

Add to Section 3, the following (or similar):

(e) buildings are designed, constructed and maintained in a way that reduces their exposure to floods (NB this could simply refer to all natural hazards)

Add to section 4, the following (or similar):

(x) the need to ensure their buildings and their occupants are adequately protected from exposure to floods (NB this could simply refer to natural hazards)

(NB - Further consideration may need to be given to the extent to which curtilage and access protection are adequately addressed by the wording.)

Option 10

Alter wording of section 72 to commence, "Despite section 71, a building consent authority **may** grant…."

Add to Section 72(a):
After the work "property", the following or similar words: "or increase the risk of exposure to a natural hazard".

Add to Section 72(c):
"or to apply additional or specific conditions to address special features of the land concerned covered under section 35"

Option 24

Alter wording of section 112 (2) (b), as follows:

(iii) Flood risk reduction, or better performance of the building in a flood event.

(NB - If a new building code relating to flooding is developed, a subsequent change to section 112(1) would also be desirable.)

Alter wording of Schedule 1, to add a new (a) (v) as follows:

Any repair, maintenance or replacement of any part of a building or building system that is located within a flood hazard or residual flood risk area that is identified in the district plan.

(NB - This wording will only work if the relevant element of the NPS as drafted has effect. Alternative wording would be needed if it is not proceeded with. This could probably only refer to a building that has experienced flood damage, so would not provide the same level of opportunity for improvements prior to flood events).

Soil Conservation and Rivers Control Act changes

Option 12

Alter the long title to the Act delete the last clause starting ", and to…" and

Add either "..the reduction of risk from flooding so as to reduce and manage exposure of people and assets to flood hazards and their effects "

Or

Just add at the end "with the purpose of flood risk management" and then …

Insert a new item in Interpretation section as follows;

flood risk management includes but is not limited to:

- non-structural measures such as flood-proofing of building elements, use of innovative drainage systems and methods, setting floor levels, and locating accesses in ways that reduce exposure to flood waters
- managed retreat.

Appendix 3: Analysis of Options in Summary Form

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
NPS Option 1 Precautionary principle	High because it sets a fundamental principle for consistent planning practice across all agencies Prevents inaction if information not available or exact Fills gap in flood risk management framework by providing direction for all agencies	Clarifies purpose of FRM thus reduces costs of implementation Ensures flood risk is assessed Enables action where information is limited Reduces flood damage costs over time through greater emphasis on avoidance, reduction and retreat Reduce cost in upholding and defending the application of imprecise information Reduced litigation Risk exposure more transparent Precautionary thus includes climate change impacts	No direct costs Potential cost of lost opportunity if applied too conservatively (i.e. if development is unnecessarily prevented)	Benefit to community through reduced litigation and reduced costs of flooding Potential costs could lie with developers and landowners Note: Central government costs in NPS process (applies to all NPS provisions)	Better integrated CDEM and planning Property owners and ratepayers have reduced damage costs over time	NPS timeframe	**P1 -** Very effective in getting action; low cost because NPS under preparation; easy to implement as clear as to purpose
NPS Option 2 Information assessment	High because allows progress in reducing flood risk	Enables planning progress to be made	Progressive investment in information	Local communities Councils	Publicly available information	NPS timetable	**P1 -** Very effective as it encourages action and reduces litigation; low

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
	Integrates LA activity better than status quo Builds on existing legislation and enables it to be implemented better	Aligns with climate change risk reduction, adaptation government "policy" Reduces costs of flooding of buildings and infrastructure from application of best available information.	acquisition	Central government Insurers Utilities	Links to complementary activities and thus integrates better than status quo and encourages coordination between agencies		cost as it clarifies information standards; easy to implement where there is information and where no information encourages obtaining it and thus improving knowledge of flood risk
NPS Option 3 Repository of information	High because integrated with other NPS actions	Every local authority will have information in one place and it will be available to the public Community benefits of improved access to information Benefit to central government which gets better assessment of national costs	Up front cost of collating historical information together particularly for councils who have not yet started this process Cost of maintenance and upgrade of data Higher costs for those councils who have not advanced FRR – see Harrison Grierson assessment	Costs and benefits for councils Costs and benefits for community Councils who have not advanced FRR will bear greater costs	Interrelates with national research strategies e.g. climate change, CDEM planning, and plans of other public and private agencies including insurers and infrastructure providers.	NPS time table Note: A target date for implementation could be included in the NPS and this would set the timetable	**P1/2 -** Very effective as improves risk transparency; low cost where information already accessible and medium cost to get information together where councils do not have it accessible; relatively easy to implement and easy to maintain once set up. Note this is not an option to the National information repository it is complementary to it
RMA Option 4 S7 addition	High, as would make flood risk a matter to which particular regard must be had	Raises profile of flood hazard and risk Elevates importance of flood hazard and risk issues in all RMA considerations	Legislative process costs Some lost development opportunity but community benefits from	Central government, councils plus communities		Could be done with second tranche of RMAct changes – 12 months	**P3 -** May not be effective as S7 is becoming very long and complicates consideration of too many matters of national importance; low cost as it could be included in upcoming RMA changes;

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
			reduced flood damage costs				could be complicated to implement in planning practice. This option is not favoured compared with other options for achieving the same thing
RMA Option 5 Effects of climate change to include floods	Very effective to clarify meaning of CC effects and feeds back to all part 2 considerations	Encourage planning action and improved planning practice Greater chance that flood risk will be addressed in planning	Legislative process costs Some lost development opportunity but community benefits from reduced flood damage costs	Central government, councils plus communities	Climate change policy implementation on adaptation	Could be done with second tranche of RMAct changes 12 months	**P1 -** Very effective way of bringing flooding into the RMA specifically and in context of climate change impacts; low cost as could be included in upcoming RMA amendments; easy to implement as councils are seeking clarification of climate change effects
RMA Option 6 NES	Only effective if a companion NPS Not very effective as the specific measures need to be chosen by communities and are particular to local conditions	Encourage planning action and improved planning practice Greater chance that flood risk will be addressed in planning	Higher costs than Options 4 and 5 because developing a new instrument Some lost development opportunity but community benefits from reduced flood damage costs	Central government, councils plus communities	Would only work in context of a simultaneous NPS	RMAct process timetable	**P3 -** Not very effective as the specific measures need to chosen by local communities; high cost to produce; difficult to implement as difficult to get national agreement
RMA Option 7 Direction	Could be effective if included informally as a preamble to the NPS	Encourage planning action and improved planning practice Greater chance that flood risk will be addressed in planning	Costed as part of an NPS	Central government, councils plus communities	With rest of NPS and clarify intent of NPS	NPS timing	**P1/2 -** Could be effective alongside all other options for NPS as makes acceptable risk levels clear; could be time consuming and hence costly to decide

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
							levels that would be included as acceptable; easy to implement once levels decided
RMA Option 8 Cancel existing use rights (TLAs)	Could be very effective in reducing risk if applied in conjunction with plans	Aligns legislation across all councils Note: would be out of sync if only applied to flood hazards and not all other hazards at the same time	Consent process and costs of mitigation built in to subsequent consent conditions	Landowners Councils Insurers Utilities	Reduced ongoing costs of flood damage Applies responsibility at the "right" level i.e. otherwise regional rules are required to achieve the same outcome as they only at present have that power Highly synergistic if applied to all natural hazards	Could be done with second tranche of RMAct changes – 12 months	**P3 -** Very effective if done in conjunction with plans; high cost to change legislation as part of RMA amendments as quite contentious without provision for compensation to landowners; difficult to implement
BA Option 9 S3&4 resistant and resilient buildings	Very effective for similar reason to option 1	Clarity and clarification of purpose for implementation of BA Aligns with sustainability provisions	Low for minor legislative clarification	Central government LG in administering the BA	Filling a gap in current statutory framework	12-18 months	**P1 -** Very effective as it provides a platform for progressive practice improvements and innovation and synergies because it retrospectively addresses other natural hazards; low cost as small legislative changes; easy to implement
BA Option 10 S72 "may" plus new wording	Very effective as wording means currently that councils often have to grant consent. This reverses the presumption in hazard situations	Improves ability to manage flood hazard and reduces risk and costs of litigation	Legislative change costs Greater than 9 because more likely to be challenged	Councils, central government through avoided flood damage costs, insurers, utilities	Be more consistent with the planning system thus better integration	12-18 months	**P1 -** Very effective as it removes legislative contradiction thus improving clarity around risk reduction; low cost as small legislative changes;

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
			Some costs to developers where there is a flood risk				easy to implement
BA Option 11 BA code for flood risk flood resilient buildings	Very effective because code standards brought up to date and integrates with CDEM for post event recovery	Better integration and alignment with planning and encourage continuous improvement	Some costs to home owners and developers additional to building reinstatement or renovations BUT note potentially less than updating earthquake standard requirements	Widely spread in community Initial cost to central government in developing code	Potential synergy with other code benefits	12-18 months for full consultation process	**P2 -** Very effective as it provides clear guidance and would be aligned with other legislative amendments; a major change that would require a lot of work as it would have to go through extensive consultation; easy to implement once completed
Other Leg. Option 12 Consolidated Natural Hazards Risk Reduction Statute	Very effective in clarifying all flood risk management legislation and roles and responsibilities in one place Strong synergy with Option 35	Clarity for flood risk reduction actions. Can clearly define flood risk reduction activities Better alignment of legislation with agency responsible as all in one place	Consultation and legislative drafting Realignment and reorganisation of roles within agencies possibly needed	Benefits to all those currently responsible Central government costs initially for consultation and drafting	Synergy with local government implementation and with CDEM activities and clear and all in one place	12-18 months	**P2 -** Very effective as overcomes legislative uncertainty; low to medium cost for consultation and drafting; easy to implement as clarifies law and consolidates it. Would work best in context of Option 35.
Other Leg. Option 13 FRR purpose in SC&RC Act and LDA	Moderate, because legislation would still be fragmented, despite improved purpose	Provides consistent purpose and clarifies legislation. Broadened mandate for river management and drainage works and their maintenance.	Legislative change cost (low end)	Central government LG in administering these Acts	Would overcome some problem aspects of existing legislation, and dovetail better with other legislative responsibilities	6-12 months	**P1 -** Very effective as it makes the Act consistent with other RMA and BA amendments by including planning and retrofitting measures as part of flood risk management; low cost legislative change that could be done with other changes; easy to

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
		Strengthens local authorities mandate in key areas.					implement as clarifies law
Other Leg. Option 14 Merge SC&RC and LDA and LGA	More effective than Option 12, as relevant local authority powers and responsibilities would lie within a single statutory instrument.	Consolidate and streamlines legislation. Would clarify some powers and responsibilities.	Legislative change cost	Central government LG in administering these Acts	A review of powers and responsibilities would be encompassed. Legislation more streamlined, integrated and clear.	12 months or more	**P2 –** Very effective, but relatively major. Will be needed at some stage, so sensible to undertake at same time as range of other flood-related activities.
Other Leg. Option 15 Financial reporting	Moderately effective in terms of ability to identify and monitor prioritisation and expenditure on planning and flood response.	Enables review of performance by community, agencies and central government.	Low unit costs, and widely dispersed	Local government	Greater transparency, in and between different areas	6 months – 1 year	**P1 -** Very effective as it makes financial provision transparent for flood risk reduction activities and enables improved monitoring; low cost Schedule change; some upfront administrative costs after which easy to implement
Funding Option 16 Financial support for planning	Highly effective for small number of areas to which it would apply.	Enables targeted effort where most needed and least able. Helps avoid future emergency relief cost by flood risk reduction.	Central government, $1-2 million over several years (depending on number of areas)	Specifically targeted	Integrates with other government policy	1-3 years (spread over this period)	**P2 -** Very effective in getting better flood risk information and planning in some high risk areas which would enable risk to be reduced through planning measures; medium cost of setting up policy and of grant assistance and some difficulty getting agreement that the Crown should contribute as a landowner beneficiary; easy to

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
							implement once policy agreed
Practice Option 17 NPS additions	High, as would strengthen local government agencies hands in planning	Clarifies and strengthens national policy and thus smoothes planning processes and reduces cost	Costs in meeting NPS plan requirements (see draft S32 for NPS), but clarity could reduce costs over present NPS draft.	As for Option 1.	Better integrates CDEM and planning. Property owners and ratepayers have reduced damage costs over time.	NPS timeframe	**P1 -** Very effective ways of achieving direction for flood risk reduction; medium cost with high benefit; easy to implement as clear direction that would be implemented through existing processes
Practice Option 18 Best practice guidance	High, as innovation and learnings from experience are spread.	Enables better and more consistent practice Reduced cost from lack of planning long-term Learning from experience of others rather than "reinventing the wheel" reduces cost	MfE cost in collecting and preparing material and populating website – relatively low	MfE Local government and thus communities benefit	Integrates with other planning / sustainability	Could start now. Some ongoing effort needed to update.	**P1 -** Very effective as it supports the NPS and legislation changes; medium cost to produce but high benefit; easy to implement through existing channels
Practice Option 19 LG forum	High, but potentially only temporary as a one-off. Nevertheless, could kick-start practice improvement and integrate well with ongoing effort under Option 17.	High, as a kick-start mechanism towards better, shared practice.	One-off. Low	Cost and benefits – organising agencies plus LG attendees, all have some cost and ongoing benefit	Strengthens network for ongoing actions	Short, but best-placed post NPS	**P1 -** Very effective way of sharing information and raising profile of flood risk reduction once the changes are in place to assist implementation; low cost of meeting together with high benefits; easy to implement as councils used to such forums

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
Practice Option 20 MfE monitoring role	Moderate to high. Most effective in terms of enhanced role for MfE (see Option 32)	Moderate to high, as would highlight issues and provide basis for review where needed	Depending on framework and method, probably relatively low per unit agency	Dispersed LG input. Some MfE cost in setting up framework and reviewing information annually	Contributes to improved RMA monitoring – an existing role	Short, but ongoing	**P1 -** Very effective as it sets up a way of assessing the impact of flood risk reduction actions; low cost as could be done with existing resources; moderately easy to implement as done for other activities
Practice Option 21 CDEM guide revision	Effective if NPS and RMA and BA changes are in place	Draws attention to opportunities for planning at the stages of readiness and response Provides a platform for active participation in the planning process by CDEM staff in agencies Clarifies responsibilities for linking CDEM with the planning process	Minimal if changes made as CDEM Guide is revised	Central, local government communities and utilities	Improved linkages across the flood hazard management system	6 months	**P1 -** Effective way of bringing the planning and CDEM activities together; low cost as review currently underway; easy to implement through existing CDEM channels
Readiness and response Option 22 Information to communities	Could be useful if dissemination designed well	Empowers communities to take risk reduction actions as part of readiness and response	Low costs of information production and dissemination	Council CDEM and communities	Could be done at same time as other information dissemination so a low cost but high synergy	0-1 yr	**P1 -** Effective way of providing flood risk planning options information through existing channels; low cost to produce information that would be produced by other options –guidance and practice information; easy

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
							to implement through existing channels
Recovery Option 23 MfE / Min CDEM best practice advice	Effective. Similar to Option 17, but targets broader audience	Enables better and more consistent practice Reduced cost from less effective practice Learning from others reduces cost overall	Central government agencies in collecting and preparing information and populating website – relatively low	Central government agencies initial costs. LG benefits and thus community benefits long-term.	Integrates CDEM and planning practice	Could start now – some ongoing effort needed to update	**P1 -** Effective in providing practical detailed information on planning flood proofing and retreat measures; medium to low cost; easy to implement through existing channels at councils
Recovery Option 24 Pilot projects	Likely to be highly effective if resulting information is widely disseminated as case studies (costs / benefits)	Specific to projects, but wider benefits to LG, communities and property-owners	Some sunk cost, depending on nature and extent of pilot areas	Ideally shared amongst agencies, property owners, infrastructure	Demonstration in practice of best practice advice, trial of pre-planning techniques, helpful in Recovery stage	1-5 years	**P1 -** Effective as they would provide demonstration to support Option 22; medium cost to set up and produce but high benefit; easy to implement through existing channels
Recovery Option 25 BA Changes	Very effective (as in Options 9 and 10)	Speeds recovery in practice (ideally practice based on pre-planning) Flood-proof retrofitting is important outcome, beneficial to homeowners and wider community	Probably reduced costs overall as processing time loss and uncertainty reduced.	Central government – legislative change	Major potential benefit during recovery to community, CDEM agencies and insurance community	BA change – 12 months	**P1 -** Very effective as removes the opportunity to exacerbate flood damage; low cost as could be done with other legislation changes; easy to implement once policy changes made
Recovery Option 26 Amend Adverse Events Rural Assistance	High effectiveness	Avoids risk of reinstating activities with individual or cumulative flood risk implications	Low cost, as simple policy change Later, possible cost implications	Specific rural locations – individuals and communities	Integral part of response and pre-planning	3 months	**P1 -** Very effective as removes the opportunity to exacerbate flood damage; low cost as could be amended by cabinet agreement; easy

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
Policy		Community benefit by avoidance of exacerbator effect	for landowner, but these offset by wider community benefit				to implement once policy changes made as system all designed to manage it once an event occurs
Recovery Option 27 EQC cover change	Very effective.	Would put most frequent natural hazard on same basis as all others Would fill gap at present where loss of property through landslide, coastal collapse, is covered, but inundation is not Benefit in potential to remove/reduce reluctance to have retreat policies.	Moderate to implement. Minor in long term (anticipated to impact on EQC claims)	Spread across whole community, but benefits directly only those who need it. Secondary benefit in more certainty about Recovery.	Integrates with CDEM "package".	Significant policy review. Consultation needed – say 2 years	**P2 -** Would be very effective as all hazards covered and would streamline claims process; a significant policy change which would require medium cost to agree and to set up new processes; easy to implement once agreed with high benefits
Recovery Option 28 Change of EQC role to community coordination	Very effective	Fills a gap in terms of recovery. Close alignment with other significant natural hazards planning and response	Medium to high to implement – consultation, policy change, establishment costs	As for Option 26	As for Option 26	As for Option 26	**P2 -** Would be very effective as it fills a gap in community recovery and contributes to community well-being; low costs to set up; would require time to implement but with high benefits
Recovery Option 29 EQC to cover flood-proofing improvements	Very effective	Individual benefit in retrofitting. Community/ government benefit in avoiding future recovery costs.	Moderate to implement and maintain (anticipated to involve a share of overall EQC costs)	As for Options 26 and 27	As for Options 26 and 27	As for Options 26 and 27	**P2 -** Very effective as it directly improves resilience; low cost and high benefit of avoided damage costs to communities and government; easy to

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
							implement once set up
Recovery Option 30 Encourage private insurance to support retrofits	Moderate to high (depending on agencies responses in practice)	Potentially high to insured, and to insurers due to future costs being avoided or reduced	Low – little or no addition over reinstatement (see Option 23 pilot, which could trial this)	Costs to insurance agencies – widely spread but low. Benefits to insured potentially high. Insurance agencies gain benefits in long term.	Resilience of communities improved. Improved recovery in future due to reduced risk/effects.	Could start now.	**P1 -** Very effective to align with EQC betterment cover and would increase use flood proofing and retreat and thus reduce flood risk; low cost; easy to implement once signals come from council practice and plans
Recovery Option 31 Flood events drive plan reviews through the NPS	Moderate to high (note, does not substitute for NPS requirement – rather requires ongoing attention and reporting).	Continuous improvement to plans and planning practice	Variable, depending on events	LG benefits to community through improved planning	Integrates with pre-planning and CDEM	As and when events occur	**P1 -** An effective way of linking recovery with planning and would reduce risk over time; low cost way of alerting need for planning provisions; easy to implement through existing channels
Recovery Option 32 CDEM groups to advise on plan change needs/opps	Moderate to high	Potential to provide a level of detail not otherwise obvious, as a basis for planning. Could generate new ideas	Initially low – subsequent costs of plan change	Low costs to CDEM groups (they will have thought of the ideas/advice anyway). Benefits to communities	Totally integrated with CDEM and planning function. Key feedback opportunity	As and when needed – depends on extent of plan change resulting	**P1 -** Effective way of bringing the planning and CDEM activities together; low cost as review currently underway; easy to implement through existing CDEM channels
Institutional Option 33 Strengthen MfE capability	Moderate to high	Supports government policy, existing legislative mandate, NPS. Assists local	Moderate – low (depending on whether additional or transfer of capability/effort)	Central government – MfE (but see cost box)	Improved function in context of other flood reduction effort by other agencies (CDEM, LG, civil society)	6 month, ongoing	**P1 -** Very effective in underpinning support for NPS and other legislative and guidance changes; low cost with high benefits that would fill

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
		government performance through advising and monitoring function					gap in support and direction; easy to implement if resources available
Institutional Option 34 Strengthen another central govt. agency (e.g. MCDEM)	Moderate to high	Brings policy and operational hazards management together Assists local government performance through advising and monitoring Better linkages across hazard management activities	Some transition costs through legislation change and staff transfer or capability building RMA administration would still be in MfE so need for coordination still needed	Central government e.g., MCDEM	Improved function in context of flood management in other agencies e.g. CDEM, LG, civil society	6-12 months including cabinet decisions, legislation change	**P2**- would be very effective as policy and operational aspects of hazard management all in one agency; transition costs up front for change although medium; reasonably easy to implement as requires a small legislative change
Institutional Option 35 MFE and MCDEM merge hazard management functions – new agency	Tie together the CDEM functions but could dislocate from planning functions Could be effective if accompanied by integrated legislation	Would simplify responsibility to one agency and thus ensure better integration Clear point of call for local government on flood risk management and leadership Better integration of flood information functions	Costs of reorganisation to both existing agencies Dislocate from planning function (but joined to operational function)	MfE and MCDEM and local government until change embedded	Would enable the "4Rs" to work seamlessly and opportunities for risk reduction to be effected at readiness and response and recovery stages	6-12 months including cabinet proposal consultation and cabinet decisions	**P2 -** Would be effective in encouraging a seamless group with policy and operational functions for a single purpose of risk reduction; some complexity to make organisational change and bed in at the beginning; some issues in implementation in merging different organisational cultures but could work in the long run.

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
Institutional Option 36 Change EQC mandate	Would be very effective in improving the service to the public after flood events – community well-being benefits	Better public services after flood events Improved community well-being Clarity with all hazards total loss claims in EQC	Analytical and decision making costs across government Implementation costs – information about changes	EQC, MCDEM, MfE, Treasury and clients in the transition	Enable affected public to get better services after flood events	Minimum 12-24 months depending on legislation priority and complexity of proposed change	**P2 -** Would be very effective as all hazards covered, would streamline claims process and fill a gap in community recovery; a significant policy change but would have medium cost to agree and to set up new processes; easy to implement once agreed with high benefits
Institutional Option 37 EPA include flood risk through NPS and NES	Not directly affecting the effectiveness of flood risk management	Could possibly ensure faster development of an NPS although that is not assured by changing to a new organisation	Transitional costs associated with change Could increase costs if policy functions still in MfE as chance of dislocation of staff from in EPA from policy and policy staff from the implementation and monitoring of NPSs and NESs	MfE, if with ERMA then that organisation	Could possibly focus NPS activity and get faster production	12-24 months	**P3 -** Ineffective way of advancing flood risk reduction as it would split resources between agencies and leave aspects of planning stranded; high cost change to make and gains could be lost; difficult to implement as EPA would be set up for other reasons that flood risk reduction
Hazard Assessment Option 38 Hazards data and repository at MfE	Effective, as central, comparable and able to review quality.	Enables national overview of issues/risks/cost exposure. Enables review of long-term trends	Some cost in establishing, reviewing and maintaining data – if Option 3 implemented this would be less than if Option 3 is not implemented.	Benefits to central government monitoring, research agencies, and wider community	Inter-relates with national research strategies (see Option 3)	Could commence now.	**P1 -** Very effective for monitoring of progress in flood risk reduction and gives ability to know costs of damage and thus avoided costs as flood risk reduces; medium cost to set up; easy to implement and complementary to local council repositories

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
Hazard Assessment Option 39 LTCCP information consistently produced	Would be effective in enabling information to be compared between councils	Ability to compare flood risk management across councils Monitoring benefit	Minimal	Central local government	Other flood risk management agencies CDEM utilities etc	1 year max	**P1 -** An effective improvement in transparency on levels of investment in flood risk reduction and useful for monitoring progress nationally; low cost after some upfront system and processing cost; easy to implement through existing systems at councils
Hazard Assessment Option 40 A time requirement	Potentially effective, although may put undue pressure in some areas, depending on timeframe actually set	Emphasises need to act. Would advance action and reduce inaction.	Costs of compliance – part of NPS	Local government	In context of NPS and overall planning responsibilities delivered	NPS timetable	**P1 -** Very effective as flood information available within a known timeframe and would help reduce flood risk when used with legislation change options and NPS; medium cost to produce especially where information doesn't exist or is poor; easy to implement if sufficient resources
Collaboration Option 41 MOU	Relies on people to behave according to agreement –evidence shows that they are breached more often than not A blunt instrument for	Focuses parties on outcomes	Transaction costs in preparation high and increases with number of involved parties Maintenance of	Mfe, MCDEM, DIA, MAF, DPMC(DESC responsibilities)	Could enhance relationships for other activities	6-12 months	**P3 -** Ineffective as voluntary and influenced by government priorities which change through time; high transaction costs to produce; difficult to implement effectively

	Effectiveness	Benefits	Costs	Distribution of benefits/costs	Co-benefits / synergies	Time for implementation	Suggested priority / comments
	increasing interagency cooperation		MOU high if differences of opinion				as rely on good will across competing interest
Collaboration Option 42 Shared SOIs	Similar to 39	ditto	ditto	ditto	ditto	6-12 months	**P3 -** Ineffective as voluntary and influenced by government priorities which change through time; high transaction costs to produce; difficult to implement effectively as rely on good will across competing interest
Collaboration Option 43 Cross government strategy on flood risk reduction	By itself a weak instrument as it can be changed easily and its priority changed through the electoral cycle. Not enduring. If underpinned by the package of options above would be a necessary part of the effectiveness of this option	Necessary but not sufficient in itself. The work has already been done for this and is being expressed in NPS plus other FRR activities. Needs to be publicised more with local government and other agencies involved in FRM	Sunk already Communication and publication of strategy	MfE plus other agencies	Legislative and other improvements above would enable the strategy to be implemented and thus enhance the chance of success on this option	6-12 months	**P1 -** Very effective in providing the information to underpin the NPS and legislative changes; low cost using existing resources; easy to implement through existing channels
Collaboration Option 44 Support by DESC and Geospatial Office	A necessary support part of flood risk management.	Geospatial Office provides a cost effective way of coordinating data and information on floods. Improves on current situation where no national standardisation of flood risk information	Uses an existing mechanism so low cost option c.f. setting a new arrangement	Benefits to local and central government. Costs to existing agencies	Can use coordination knowledge so high synergy and can consolidate for all hazards	DESC now; Geospatial Office support needs to be developed over next 6-12 months	**P1-** very effective **using** existing arrangements and underpins other options; low cost, using existing resources; easy to implement through current arrangements

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