



**Te Uru
Kahika**

Regional and
Unitary Councils
Aotearoa

**A CALL FOR NATIONAL LEADERSHIP AND URGENT ACTION TO
MEET THE FLOOD HAZARD RISKS ARISING FROM CLIMATE CHANGE**

Central Government Co-investment in Flood Protection Schemes Supplementary Report

RIVER MANAGERS SPECIAL INTEREST GROUP
JANUARY 2022



Central Government Co-investment in Flood Protection Schemes
Supplementary Report

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Preface

Purpose

The **purpose** of this report is to add weight to a 2019 regional council co-investment business case for central government co-investment in flood protection schemes. This is because the evidence continues to grow supporting the importance and urgency of government returning to the table to resource and help focus purposeful, timely and meaningful actions that result in practical flood protection scheme improvements.

Outcome

The **outcome** sought from these co-investment decisions would be New Zealanders having assurance that suitable 'fit-for-the-future', risk-aligned, climate change resilient and environmentally sensitive flood protection schemes are in place throughout New Zealand. This is the priority action to respond to the increased magnitude and frequency of climate-change-induced flood events. It sits alongside the need to apply a full suite of other actions e.g., spatial planning and integrated catchment management, to enhance community resilience against flood risks.

Vision

The **vision** underpinning this outcome is higher levels of safety, security and community resilience, enhanced protection of local and national assets and more sustainable regional economic activity. The **refocus** inherent in this vision is a necessary shift in central government attention from disaster relief and rehabilitation towards necessary 'top-of-the-cliff' mitigation of flood risks, with reduced all-up costs.

Audience for this report

The intended **audience** for this report is the Ministers for Local Government, Finance, Regional Development and Climate Change, alongside senior officials from MBIE (Kānoa) DIA, NEMA, MfE and Treasury, Environment Canterbury (who co-sponsored this report) and Regional Council CEOs and Chairs.

Requested action

The **sought-after immediate action** is central government urgently agreeing to co-invest in flood protection schemes. The subsequent and necessarily focused next step is to form a central government / region council group to define the quantum, timing, principles, framework, criteria, and priority projects for central government co-investment into flood protection schemes. We urge that central government commit to taking these steps.



Jenny Hughey

Chair, Environment Canterbury



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Executive summary

Higher magnitude and more frequent floods are occurring

The 31 May – 2 June 2021 Ashburton / Canterbury flood event was extreme. Both branches of the Ashburton / Hakatere River burst their banks. The Defence Force was deployed to assist with potential evacuations. The State Highway One Bridge over the Ashburton / Hakatere River was closed because of concerns about its structural stability. Other Canterbury flood protection schemes were stretched to their maximum.

The Canterbury storm event and flooding caused extensive damage to farmland but little damage to residential properties. Thankfully, there was no loss of life. The town of Ashburton was largely saved from greater damage by a well-designed urban flood protection scheme. Further damage was averted by timely community leadership.

Similarly, the foresight of the Marlborough District Council was such that flood protection investments, made after the major 1983 flood, worked largely as expected. These protected Blenheim, and its extensive surrounding wine growing district, from the potentially much greater damage that could have occurred with the July 2021 flood.

Not so fortunate were other rural areas of the Marlborough District that were not protected by flood schemes. Roads and farms in the Rai Valley were extensively damaged. Five months later, transport disruptions caused by Marlborough-wide storm-induced slipping and related on-going recovery work, are still occurring six months after the event.

Westport was also not as fortunate. A relatively modest early investment (\$10 - \$20m) in flood protection works at Westport would have saved the area from the over \$100m in direct flood damages to property it is currently enduring. It would also have avoided the substantial and on-going effects on the physical and mental wellbeing of the whole Westport community. The impacts of the July 2021 flood on Westport will take many years to recover from. The Government, insurers and the people of Westport will carry that cost.

The 2021 Canterbury, Westport and Marlborough floods are all examples of an increasing series of recent major flood events experienced throughout New Zealand. Other examples of extreme weather events have also occurred in 2021. The Kemeū area, west of Auckland, experienced its second wettest day on record on 31 August 2021. Up to sixty homes were evacuated. On 5 November 2021, Gisborne received three times the average rainfall normally received in the month of November. Widespread flooding, evacuations and 16 slips occurred but the CBD of Gisborne was largely protected.

Other major events have occurred in the last two years. The biggest of these were in Southland, Otago, West Coast, Northland, and the Bay of Plenty regions.

International precedents

New Zealand is not alone in facing the challenge of addressing the effect of extreme weather events and associated flood hazards. All countries are facing similar challenges. The United States and the United Kingdom have recently acted with urgency to significantly ramp-up their investment into flood protection schemes. The nature of New Zealand's landscape and our location in the 'roaring 40's' makes the challenge we face of even higher magnitude than in many other countries.

Flood protection schemes make a significant contribution to community resilience

The above New Zealand examples provide a stark reminder of the important role flood protection schemes play in defending 'at-risk' communities from the full impact of extreme weather events.

What is vital, is that the lessons learned from these latest disasters do not fade away. Putting in place substantive changes to improve the long-term resilience of communities, by – among other things, enhancing the role played by flood protection schemes, requires priority attention.

Flooding is the number one natural hazard in Aotearoa. New Zealand now faces, on average, one major flood event every eight months. Flood protection schemes are the first line of defence. They provide protection to around 1.5 million hectares of our most intensely populated and used land. They also provide safety, security and protection to the families, Marae, livelihoods, and communities living alongside our rivers in over 100 towns and cities. In total, these schemes currently provide an estimated annual benefit of over \$11 billion each year. This is over five times the capital replacement value of the schemes.¹ The schemes have been some of the best value public investments ever made in New Zealand. Addressing contemporary challenges will require a step change in investment to occur like that made half a century ago. This investment will prove to be similarly valuable.

The challenge to be addressed

The challenge is this. Regional council² current annual maintenance and capital investments in flood protection schemes total close to \$175m³. This is not a sufficient level of investment to provide for the level of security desired and now required by New Zealand communities. Regional councils intend to increase their investment by a further \$25m in future years to total \$200m. This will not be enough. They estimate the annual capital cost of building further resilience into flood protection schemes would be at least \$150m beyond their current intentions.

Community tolerances about levels of acceptable risk are increasingly being tested. Regional councils now have improved knowledge about how schemes perform during severe floods and the flood levels they should be designed to withstand. These were not contemplated when the schemes were constructed decades ago. They are certainly not adequate to address climate change. The \$200m of regional council increased investment is primarily to enhance⁴ the ability of existing schemes to withstand the increased frequency and magnitude of climate-change-influenced future flood events. The need for \$150m of additional central government funding must urgently be addressed.

There is no question that greater use of a 'multi-tool'⁵ approach to building community resilience against the effects of flooding is required. More focus on the more effective use of improved planning tools to define where and how development occurs, will be particularly important. However, a focus on the use of planning tools cannot replace the fundamental importance of further investing in flood protection schemes. They will always remain the first line of defence against extreme flooding.

¹ The total estimated capital replacement value of the 367 flood protection schemes throughout New Zealand is \$2.3 billion.

² We use the term 'regional council' throughout this report to jointly encompass New Zealand's five unitary district / Auckland City Council and the eleven regional councils.

³ Regional council Long Term Plans for the period 2021-31 are currently being interrogated to provide a more precise figure of committed future investment. Work carried out as part of the previous flood protection report confirmed that planned investment was more than \$175m per annum.

⁴ In general terms, flood protection schemes should now be designed to withstand a flood with a return frequency of 200 years.

⁵ We use the term 'multi-tool' to encompass all of the approaches needed to manage floods. This may include district and regional plan requirements, building requirements, managed retreat alongside flood protection schemes and all other parts of a full suite of flood management approaches.

Equitable co-investment in flood protection is required

Present regional-council focused funding arrangements are neither equitable nor sufficiently sustainable to address present and emerging needs on their own. There is a strong case for central government to return, as a legitimate and justifiable co-investor, in improved flood protection schemes. For the past three decades, Crown-owned and related assets have received flood protection at a cost to regional and targeted local ratepayers, with little contribution from the Crown.⁶

These protected Crown assets include rail and road infrastructure, communication and electricity transmission infrastructure, some airports and education and health facilities etc. The Crown also has substantial contingent liabilities associated with public assets that it does not own, but significantly funds, such as local roads. Also protected by flood schemes is the capacity to sustain the efficient functioning of affected communities and their economies, in the face of significant flood events.

All up, Government has a broad and critical stewardship responsibility to protect and improve community resilience by reducing the risk of the failure of existing flood protection schemes. This responsibility extends far beyond their current focus on responding to flood events and assisting with recovery.

Previous regional council work to secure central government co-investment

A business case seeking a central government co-investment contribution of \$150m per annum was presented to officials in 2019 by all New Zealand regional councils.⁷ This business case has not yet achieved the task, nor central government attention, it was intended to achieve.

The business case was however valuable in helping to secure a one-off and very much welcomed central government commitment of \$217m for expenditure on 55 ‘shovel ready’⁸ / community climate resilience flood protection’ projects throughout New Zealand⁹. Work to construct these scheme enhancements is now well underway. The progress being made confirms the capability and proven reliability of regional councils – in partnership with central government, to partner to deliver these projects, even with quite short notice and in despite the on-going challenges posed by Covid-19.

The earlier business case also had some influence on the content of a July 2020 Cabinet paper. This paper provided a welcomed indication of government willingness to develop a set of principles and a decision-making framework to guide further central government co-investment in flood protection schemes. But then in June 2021, the Minister of Local Government, the Hon Nanaia Mahuta, resolved to ‘suspend’ the contribution of central government resources toward progressing this work. Correspondence to LGNZ from Minister Mahuta suggested the was because budget 2021 constraints meant that resources were not available to ‘*continue a dedicated work stream on flood risk co-investment.*’ Instead, the Minister advised the sector to focus their efforts on the National Adaptation Plan being led by MfE. The Minister also invited the regional sector to ‘*engage on the lessons learned and options for enabling greater resilience to flood events in the Buller region.*’

⁶ In the past, (prior to the early 1990s), the capital cost of substantial river management and flood protection schemes was commonly supported at levels of 50% to 75% by central government. Maintenance and operating costs at rates of around 25% were also provided. A review of documents from the time suggests this national support typically amounted to over \$114m per annum in today’s dollars.

⁷ Central Government Co-investment in River Management for Flood Protection: Critical Adaptation to Climate Change for a More Resilient New Zealand, July 2019

⁸ The ‘shovel ready’ projects that received funding were not necessarily those projects sitting at the top of a list of national priorities. They were simply those projects that were ‘ready to go’.

⁹ Regional councils throughout New Zealand are now delivering these projects – within expected timeframes and budgets. When regional council funding contributions are added in, these projects have a value of \$315m. 55 projects were initially agreed. More recently, some projects have been joined together and one project (the ‘Muggeridge’ pump project in Waikato) is now not being funded.

Regional council chairs and other community leaders have some sympathy for the workload currently being carried by central government officials but were nevertheless extremely disappointed by this decision. It ignores the reality that increased flood events and hazards are not ‘on pause’.¹⁰

Community leaders are also conscious of the importance of all parties applying more attention to a multi-tool / broad fabric approach to the future protection of homes, buildings, and community assets from floods. Regional councils have worked with DIA and MfE over the last 12 months to contribute to the development of this broad fabric of initiatives. However, they are of the view that extending the toolbox of community protection cannot and should not be progressed without giving priority focus to flood protection schemes as the ‘first line of defence.’ This is the role played by flood protection schemes. Flood protection schemes remain the number one critical existing asset protection tool.

Without further investment in flood protection schemes, the risk of communities continuing to get flooded will be exacerbated. In addition, insurers will increase the premiums they charge for protecting flood prone areas. In some instances, they insurers withdraw coverage.¹¹

Real events from 2021 demonstrate the need for urgent action

This report provides information drawn from 2021 case examples - with a focus on the 31 May 2021 Ashburton / Canterbury flooding but also drawing on information from the July 2021 Westport and Marlborough events.

The report describes these flood events and flood protection scheme locations and performance assessments, community responses, details about the on-going impacts of the flood events and scheme ‘value propositions’. Most importantly, the report also provides event-specific details about the many millions of dollars of valuable crown assets protected from 2021 floods by flood protection schemes.¹² Protection of these assets is just one of the many reasons for significant government investment in flood protection schemes, as presented herein.

Re-purposed approach to flood protection

Regional councils know the flood protection schemes of the future, compared to those of the past, must satisfy a wider spectrum of community, environmental, cultural, climate change and economic objectives. The sector is aware of the role played by schemes in supporting integrated land uses, enhanced ecological outcomes and water quality improvements. They are also aware and are responding to the role played by schemes in potentially assisting to resolve ‘drought-influenced’ water resilience challenges¹³ and contemporary iwi / Te Mana o te Wai objectives.

These objectives and challenges are real, substantial, and present right now. Regional councils have already demonstrated their ability to meet these needs. However, the high cost of meeting them, alongside the cost of increasing the ‘climate change resilience’ of existing flood protection schemes, adds to the burden for regional ratepayers to carry on their own.¹⁴

¹⁰ See correspondence from the Canterbury Mayoral Forum to the Minister for Local Government (appendix 1)

¹¹ Tower Insurance has already announced their intent to increase premiums in flood prone areas. Further details are provided in the body of this report. Enhanced investment in flood protection schemes, to keep this ‘risk’ to an acceptable level, is one of several critical actions required to keep insurers in the market.

¹² This information has been generated using valuation methods developed by economist Julian Williams.

¹³ This may include by creating wetlands to enhance ground water recharge.

¹⁴ Regional councils have already clearly displayed the need to extend their flood protection toolbox beyond simply constructing and maintaining flood protection schemes. They have applied the new principles to this area of their work. They have engaged with iwi / Māori – and will continue to actively participate in central government processes to develop a national planning framework – noting this will encompass the more extensive use of spatial planning and managed retreat tools (where appropriate).

Apportioning co-investment funding

As noted previously, central government annual funding of at least \$150 million is required. This is proposed to sit alongside the \$200m per annum to be committed by regional councils.

A long-term funding formula is proposed as a starter for a discussion about how central government funding should be apportioned. This recommends central government make:

- Co-investment of up to 75% assistance toward the cost of works to recognise the importance of adopting a **whole catchment climate change adaptation** approach, alongside achieving a wide range of other objectives.
- Co-investment of up to 50% toward the cost of the capital works required to **upgrade existing** river management and flood protection works.
- Co-investment of 33% of assistance toward the **maintenance** of existing scheme works.
- Co-investment of 75% of assistance towards the emergency repair of flood protection assets where substantial damage occurs from major storm events.

The above cost-share formula is offered as a start point for discussion. It is realistically and fairly determined and is focused on achieving the necessary step-up in protection, within a reasonable timeframe. The July 2020 community resilience / flood protection Cabinet paper offered a set of cost-share principles that should also be considered.

National leadership and urgent action required

The Government has an important and urgent role to play in leading and adequately resourcing the purposeful, timely and meaningful actions to help deliver practical scheme improvements. These improvements are fundamental to the task of greatly increasing community resilience against flooding and generally sustaining community well-being.

Details about the preferred design of a co-investment model should be prepared by a joint central and local government officials group, supported as needed by external advice. This group should be invited to provide recommendations to core Ministers and regional council chairs within three months of the receipt of this supplementary report. These recommendations should include decisions about the budget allocations required to meet immediate 2022 investment priorities¹⁵ as well as the sums that should be included in budgets for each year extending from 2023 to 2033. The recently announced ‘Climate Emergency Response Fund’ is the likely and very appropriate source for these funds.¹⁶

For more than half a century, regional councils have demonstrated they have the capability and capacity to ensure flood protection schemes deliver flood protection to New Zealanders. Regional councils have further demonstrated their ability to deliver necessary improvements by their recent performance in rolling-out the fifty-five-flood-protection scheme improvement projects.¹⁷ These selected projects were those that were ‘shovel ready’ at the time.¹⁸

Regional councils fully support government’s December 2021 decision to establish a new Climate Emergency Response Fund (CERF). It is critically important for New Zealand to commit significant financial resources to respond to the climate change challenges that are with us now, noting these will

¹⁵ The River-Link project in the Lower Hutt Valley and the proposed ‘multi-tool’ approach to flood protection at Westport are two current proposals lending themselves to immediate central government co-investment.

¹⁶ The \$1 Billion per year ‘Climate Change Emergency Fund’ was announced by the Minister of Finance on 15 December 2021. The purpose of the Fund is to assist to meet the cost of assisting communities to adapt to climate change and to build resilience against its effects.

¹⁷ These were provided with the assistance of one-off funding through Kānoa as part of the Covid related Climate Resilience Programme.

¹⁸ There are many more improvement projects requiring similar urgent action. Central government co-investment is essential if this is to occur.

increase in the future. Regional councils urge that central government give priority to expenditure of CERF-funding on necessary upgrades to flood protection schemes throughout New Zealand. Adaptation actions such as improvements to flood protection schemes are required immediately, regardless of the success or otherwise of international mitigation / decarbonisation measures.

The proposed 2022 National Adaptation Plan may be the instrument to guide expenditure of the CERF. Regional councils are participating in an MfE 'Local Government Adaptation Advisory Group.' One of the objectives of this participation is to ensure appropriate flood protection scheme investment provisions are considered by this Group and thereby included in the National Adaptation Plan. However, regional Councils fear the Local Government Adaptation Advisory Group deliberations will not be enough on their own to guide the necessary decisions. Councils therefore also urge central government support for the establishment of a working group with Treasury, DIA, MfE, NEMA and other officials (for example officials from MBIE's Kānoa Group) to develop the principals, priorities, and a project funding allocation framework to guide the necessary \$150m per annum of additional central government co-investment expenditure decisions on flood protection schemes.

Back-work to achieve this objective needs to be underway now. Without necessary co-investment decisions being made immediately, then the flooding risk to our communities will continue to incrementally increase. The consequences of not acting do not bear thinking about.

National interest in flood protection – a summary of the case for co-investment

Flood protection schemes are nationally important. They underpin the integrity of public and private assets and lifelines and provide resilience and security to communities and their investments. Central government co-investment is vital because it:

- Is fiscally **responsible and fair** to make such investments.
- Reflects Treasury's **Living Standards Frameworks**.
- Is supportive of wellbeing and social inclusion and is likely to reflect **equity / ability to pay** considerations.¹⁹
- Is supportive of **job creation, protective of previous regional economic development investments** and contributes to the desire to lift the future productive potential of the regions.
- Contributes to the security of **access routes** (rail and road) and the communication infrastructure that is vital for commerce and community functionality.
- Directly protects significant **crowd assets** such as hospitals, schools, infrastructure etc.
- Contributes to investment '**opportunity costs**.'
- Diminishes the risk of escalating **insurance** premiums, the reduction in the uptake of private insurance and the associated risk of insurance companies refusing to provide insurance cover in flood risk areas – leaving the Government as the 'bottom of the cliff ambulance'.
- Contributes to the **environmental** and water quality expectations of our communities and iwi / Māori partners.
- Provides for resilience and adaptation against the effects of **climate change-induced** 'above-design' storm events.

¹⁹ Equity and ability to pay considerations are likely to be one of the many important elements considered in designing the detail of a central government co-investment programme.

The most important of the above reasons for central government co-investment in flood protection schemes is that it will contribute to the resilience and increased levels of safety and security sought by existing and future businesses, individuals, families, whanau, and communities. Central government has a duty to share in the cost of meeting this objective.

The fundamental foundations are already in place to ‘crack on’ with improvements to flood protection schemes. Regional council have proven they have the backbone and capability to lead this task.²⁰ What is missing is adequate and equitable funding. The long-term commitment of central government funding to help regional councils meet current and future climate change adaptation, and other flood protection scheme challenges, is urgently required.

²⁰, The ‘back-bone’ performance of regional councils has been clearly demonstrated by the roll-out of the Covid related Climate Resilience Programme through Kānoa.

Central Government Co-investment in Flood Protection Schemes – Supplementary Business Case

Purpose

The purpose of this report is to provide further evidence to support the previously published²¹ business case for future central government co-investment in flood protection schemes.

The paper is supported by case study examples. These display the scale of zero cost protection benefits provided to the Crown by regional council and local rate-payer investments. They also demonstrate that Government funding has been heavily concentrated ‘at the bottom of the cliff’, rather than being smart ‘up-front’ investment in risk mitigation and resilience.

Funding challenge

The essential challenge is this: the cost of upgrading, constructing, and maintaining flood protection schemes to meet future ‘acceptable levels of risk’ and other climate change / contemporary operational demands – including the protection provided to Crown assets, is beyond the reasonable capacity of regional ratepayers to meet on their own.

Funding solution

Central government co-investment of approximately \$150m per annum is required. This investment should occur alongside an increased level of investment from regional councils and directly benefiting property owners.²²

Frequency of flood events

As a group of small islands in the ‘roaring forties’, our weather patterns mean New Zealand regularly experiences high-intensity rainfall. On average, a major damage and productivity loss-causing flood event occurs every eight months.

Floods are New Zealand’s most frequent and cumulatively - our most significant and most avoidable hazard.²³ They are the natural hazard most able to be mitigated through application of a well-proven package of flood protection schemes. They are also the natural hazard that has provided the best return on investment from measures contributing to active ‘risk reduction’.²⁴

Flood protection schemes are the first line of defence

Currently, flood damage is in most cases avoided because of the efficacy of existing flood protection schemes.

Regional council research indicates the current 367 flood protection scheme structures have generally been well maintained and managed in a prudent, professional, and efficient manner. They have also

²¹ Central Government Co-investment in River Management for Flood Protection: Critical Adaptation to Climate Change for a More Resilient New Zealand’, prepared by regional councils and completed in August 2019.

²² The proposed increase in regional councils investment is from the previous \$175m to \$200m.

²³ Over the past 100 years, New Zealand has experienced over 1,000 serious floods. This is the most frequent natural hazard New Zealand faces (Ministry for the Environment, 2008).

²⁴ NZIER report to DIA, ‘Investment in Natural Hazards Mitigation’, August 2020.

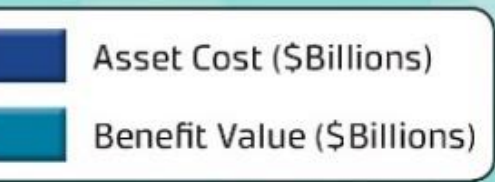
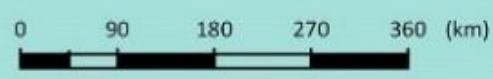
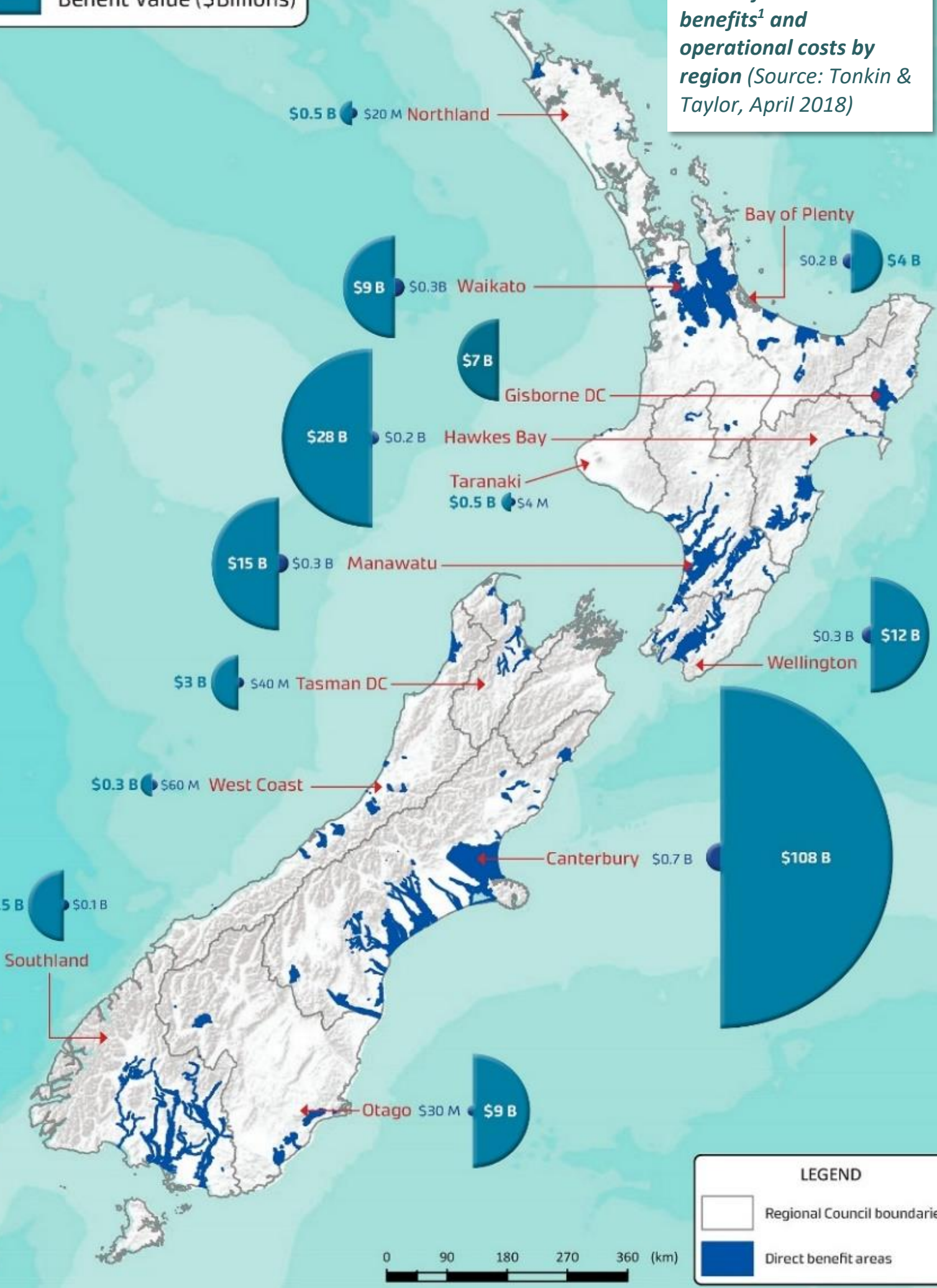


Figure one: Net Present Value of scheme benefits¹ and operational costs by region (Source: Tonkin & Taylor, April 2018)



provided good value for money (Figure one)²⁷. These schemes provide an estimated Net Present Benefit of over \$11 billion each year. This benefit value has increased markedly since the schemes were constructed because of more intensive land uses and associated increased in property values. Unfortunately, climate change impacts are effectively reducing protection service levels at many locations.²⁸ More people are now being exposed to more risks to their safety than previously. Significant adjustments are now required in the scope and scale of these schemes to meet the challenges of the future.

Climate change

Changes to the intensity and frequency of climate change-induced flood events is the biggest natural hazard challenge New Zealanders face. Climate change will substantially increase the severity and frequency of the risk of flooding.²⁹ This will cause higher levels of damage and more frequent damage to the land and assets located behind existing flood protection structures and to adjacent communities. There will be associated increased in social and environmental costs. Recent events are a salient reminder of this.³⁰ Climate change will also shift the area of geographical risk of floods and make new areas, not presently affected by such events, more susceptible to floods.

The severity of the consequences of not securing and enhancing the integrity and service levels of existing scheme structures, and the community resilience role they play, increases every day.³¹ The increased frequency and severity of flood occurrence is influenced by several climate change-induced 'additive influencers' because:

- More intense rainstorms generate higher river flows.
- Those flows cause more soil erosion.
- Higher sea levels and more significant storm surges increase flood heights for several kilometres up many river systems.³²

In combination, the above additive factors lead to more deposition of rocks, stone, gravel, and silt with resultant significantly increased and compounded flood event effects on communities.

²⁷ Tonkin & Taylor, 'Hiding in Plain Sight' (March 2018) NB the use of the 'Hiding in Plain Sight' title is appropriate. The protection provided by engineered infrastructure located at the heart of river management and flood protection schemes, is not usually visually intrusive and is not often apparent. Such schemes 'do their job,' perhaps only once or less a year. Consequently, the protection provided by such schemes is often taken for granted by New Zealanders, despite the increasing risks currently faced.

²⁸ Schemes are facing a 'pincer' challenge, where simply maintaining current assets is seeing climate change erode service levels. Ideally service levels should be substantially increasing to protect the more valuable public and private assets located behind the protection infrastructure.

²⁹ In ideal circumstances, flood protection scheme designs should provide for climate change-induced storm events capable of managing storm events that may occur between now and 2100. Such schemes would provide for an increase in peak flood flows of approximately 20% more than those expected in the period to 2000. This is based on the latest NIWA report prepared for MfE (HIRDs V4). That report states for every degree of temperature increase there is a corresponding 10.1% increase in rainfall (this is called the augmentation factor). A 10% increase in rainfall will generally translate into a 10% increase in peak flood flows. These higher flows will also give rise to increased flood heights because of higher sea levels and greater sediment flows. NB COP26 (November 2021) is aiming to reduce climate change warming by 1.5 degrees by 2050.

³⁰ A Climate Change Research Institute paper ('Climate Change Attribution', Luke Harrington, co-author, 2021) found virtually all major rainfall events between 2007 and 2017 were at least partially attributable to climate change.

³¹ Lawrence et al (2013) suggest that what is considered a 40-year return period event now, will be reduced to the equivalent of an 8-year return period event by 2090.

³² This includes large areas of drained land on the Hauraki Plains of the Waikato region and land adjacent to Edgcombe, which in some places is now below sea level.



Photo one: Canterbury late May 2021 flooding event (photo courtesy of David Williams – Newsroom)

Scope of this report

This report focuses on natural flood water flowing from catchments via rivers and streams to the sea. The paper does not include consideration of storm water systems and the network of water related infrastructure referred to within the ‘Three Waters’ reform programme.^{33, 34}

Rivers generally flow in a natural pattern across our landscape, although sometimes their flows are boosted by drainage works and sometimes their flows are constrained and channelled via flood protection schemes (figure two). The report does not include consideration of the works required to mitigate against coastal erosion or the mitigation of the effect of land inundation from waves breaking over a foredune and flooding urban areas behind these sand-dunes.³⁵

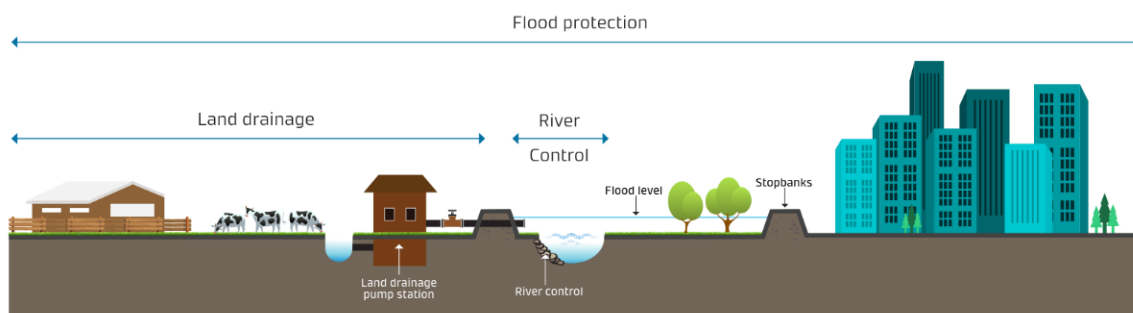


Figure two: Schematic of flood protection scheme and land drainage services (Source: Tonkin and Taylor, March 2018)

³³ The ‘three waters’ programme deals with drinking water / wastewater and storm-water treated and transported in reticulation systems such as sewers, pipes and street gutters.

³⁴ Nevertheless, the paper is entirely relevant to this reform programme. This is because of the need to manage flood water in such a way as to make it’s ‘interface’ with stormwater systems as seamless and manageable as it can be.

³⁵ Addressing the effects on communities of climate change-induced sea level rise has strong parallel challenges to those addressed in this paper.

Assets protected by existing flood protection schemes

Over 100 towns and cities across New Zealand have families and communities living alongside rivers or on flood plains that are protected by flood protection schemes. In total, river and flood protection schemes protect around 1.5 million hectares of land or 5% of New Zealand's land area. This land is where a very high proportion of New Zealand's economic enterprise takes place and where community well-being is most frequently anchored. Marae are also often located in such areas.

Schemes are designed and constructed to achieve defined performance expectations. Higher levels of protection are generally provided to urban areas compared to rural areas. Where a flood event exceeds the design capacity of the flood protection scheme, there will be resultant flooding and damage.

The 2004 Manawatū floods provide an illustration of the extent of the types of costs incurred in rural areas because of this damage. Insured losses from that event were \$112 million. However, the cost to the agricultural sector alone, in uninsured losses (lost production and uninsurable rehabilitation costs), were calculated at \$185 million.³⁶

A similar order of costs were incurred by rural communities because of the June 2021 Ashburton / Hakatere flood event. Furthermore, and as described further later in this report, recovery costs of over \$100m now being faced by the small town of Westport could have been avoided by investing around 10% of that cost into a flood protection scheme.

By contrast, work undertaken by Horizons Regional Council (figure three) indicates that of the 28,730 properties in the greater Palmerston North urban area, 12,842 properties would be affected by a flood event if the existing flood protection scheme was not in place.³⁷

Similar work – as undertaken by Greater Wellington Regional Council, indicates that over 6,500 commercial, residential, and industrial properties would have been inundated – including nine schools and many other Crown-owned properties if the existing scheme was NOT in place (figure four).³⁸

All flood protection schemes throughout New Zealand operate in a living environment. They are subject to wear-and-tear. In addition, they must now endure increased loading because of the changing nature of climate-change-affected weather events,³⁹ the increasing value of the assets they protect, the larger numbers of people to whom they provide safety, and increased expectations about reducing their impact on the natural environment.

Budgeted expenditure on flood protection

The total replacement value of the 367 flood protection schemes throughout New Zealand is estimated to be \$2.3 billion.⁴⁰

Regional authority Long Term Plans for the period 2015 to 2025 show budgets for flood protection operating expenditure of at least \$1 billion and capital expenditure of a similar amount. This excludes depreciation.

³⁶ The cost of emergency services and infrastructure repairs during the 2004 Manawatū floods was put at a further \$90 million. The flood was modelled as having a 150-year return period.

³⁷ This scheme protects these properties and communities from a flood sourced from the Manawatū and Manganui Rivers with a magnitude greater than that occurring with a frequency of 1:100 years.

³⁸ This is the number of properties that would have been affected by the flooding that would have occurred in the area adjacent to the Lower Hutt River in 2015 if it were not for the presence of the Pharayzyn and CBD stop-banks.

³⁹ This results in the 'design capacity' of these schemes being more frequently exceeded than in the past.

⁴⁰ Source: Tonkin & Taylor report 'Hiding in Plain Sight' (April 2018).

These budgets are, to varying degrees, based on a continuance of the same design paradigms applied when the schemes were initially constructed. As such, they do not reflect the quantum of the changes now needed to recognise the impacts of climate change and other contemporary challenges.

Councils are aware that a ‘step change’ in flood scheme approaches and investment levels is required. Not only is climate change effectively reducing the service levels of current schemes, but existing service levels are in many cases in need of lifting, regardless of climate change effects. This is to better protect the greatly increased value of assets and the increased size and nature of the communities reliant on flood protection schemes.

Regional councils also know they cannot and should not be obliged to meet the cost of meeting this demand solely from their own rate-payer-focused funding sources. They are saying ‘central government should pay their legitimate share - as a direct and indirect beneficiary of these works, in partnership with regional councils’. They argue that, with central government help, the necessary ‘step change’ can be achieved.

As part of their approach to the management of this challenge, Regional Council Chief Executives have formed the regional council ‘River Managers’ Special Interest Group’ (SIG). This Group has developed a ‘Five Year Sector Resilience, Sustainability and Improvement Plan’ for flood protection. As part of this Plan, a work programme has been established to assist the sector to remain at the cutting edge of the challenges associated with their community resilience / flood protection task.

Regional councils⁴¹ have the capacity to ‘get the job done’ provided co-investment funding is made available from central government to meet necessary agreed risk profile and prioritised flood protection enhancement programmes. This co-investment is now urgently required. Councils are also collectively investing in improving capacity and capability to meet the step change required to the nation’s flood protection, across the full range of methodologies available for flood protection – not just schemes.

A reminder about the history of river management for flood protection




New Zealand previously led the world with its statutory recognition in 1941 that land and water management for flood protection needed to be catchment based. This need was reflected in the purpose of the Soil Conservation and Rivers Control Act 1941 ... *‘to make provision for the conservation of soil resources and the prevention of damage by erosion, and to make better provision with respect to the protection of property from damage by floods’.*

The need to ‘make better provision’ for protection against the effects of floods clearly needs to be put back on the table. The 1941 statute led to joint investment by central government, regional communities and the directly-benefiting property owners associated with or affected by river management, drainage, and flood protection schemes.

Central government, at that time, clearly recognised it was a property and Crown asset owner directly benefiting from these flood protection schemes. It also recognised it had wider national interest responsibilities. This understanding now appears to have been forgotten.

⁴¹ We use the term regional councils throughout this report noting that it encompasses both regional councils and unitary district councils and noting these are often more formally jointly referred to as regional authorities.

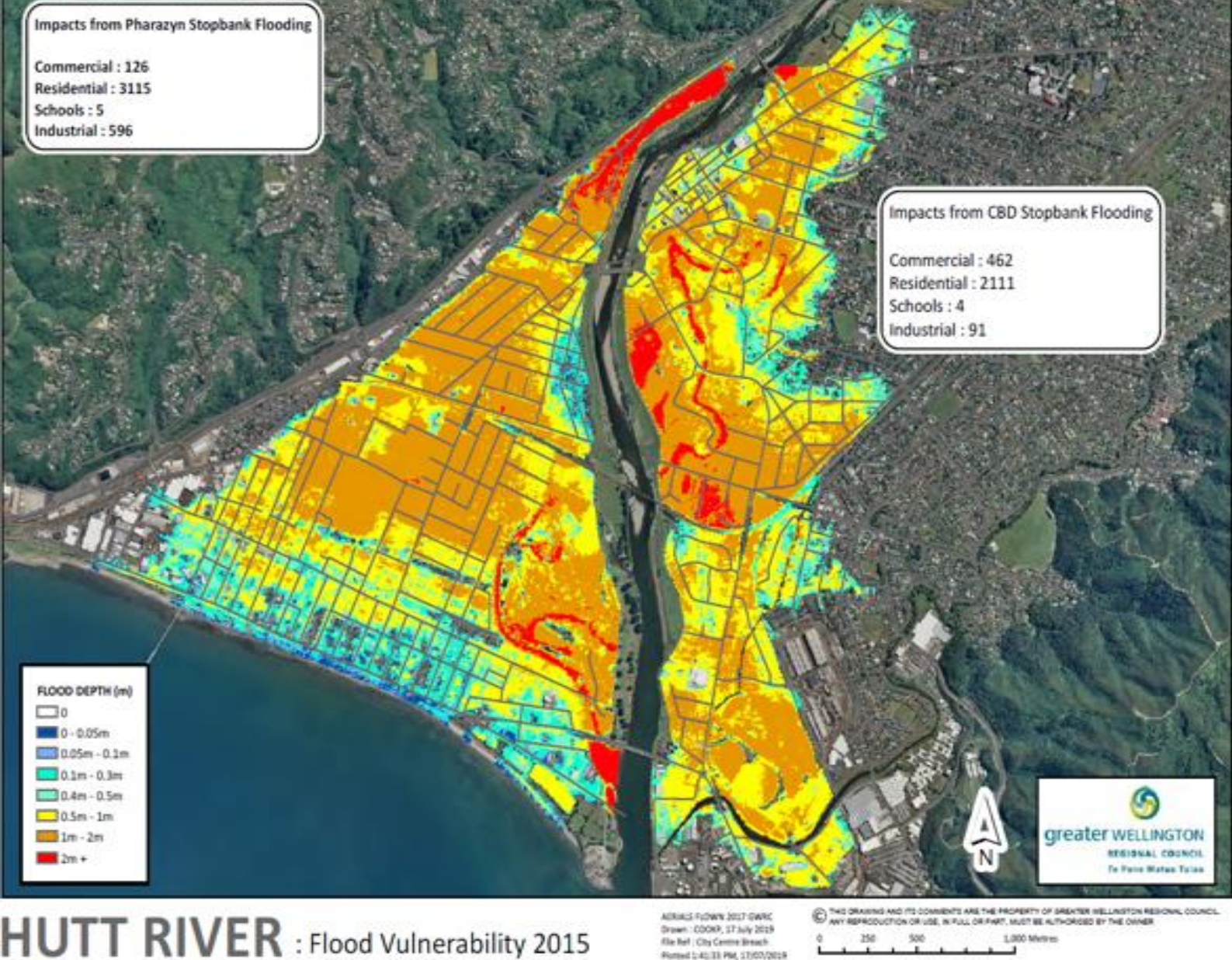


-  River: Full channel
-  Flooding: With stopbanks
-  Flooding: No Stopbanks

0 2 km



Figure three: Area of Palmerston North protected from flooding by Manawatū-Whanganui / Horizons Regional Council flood protection schemes.



HUTT RIVER : Flood Vulnerability 2015

AIRRALS FLOWNS 2017 QWRC
 Drawn: COOKP, 17 July 2015
 File Ref: City Centre Breach
 Printed 2:42:33 PM, 17/07/2015

THIS DRAWING AND ITS COMMENTS ARE THE PROPERTY OF GREATER WELLINGTON REGIONAL COUNCIL. ANY REPRODUCTION OR USE, IN FULL OR PART, MUST BE AUTHORIZED BY THE OWNER.

Figure four: Properties protected by Hutt Valley Flood Scheme

Refreshed perspective

A fresh perspective on the important role played by flood protection schemes is now required. Most river management, drainage and flood management schemes were constructed half a century ago. The value of the Crown, local authority and private assets protected by these schemes has incrementally increased. It is now very large. The type of land use activity carried out on this protected land is more intense than that envisaged at scheme design. In addition, the schemes are now required to operate in a more environmentally friendly manner.

Prior to the early-1990s, the capital cost of river management and flood protection schemes was commonly supported by central government at rates of 50 to 75%⁴². Maintenance, to ensure the integrity of the performance of these schemes, typically received 25% support from central government. Collectively, this level of support amounted to around \$40m per annum from central government - equivalent to over \$114m per annum in today's dollars.

⁴² We would note for example that the Waihou Catchment control scheme – a very large whole catchment scheme (and the largest addressed in a holistic manner in the country), received an 87.5% government grant.

Since the early to mid-1990s, river management and flood protection schemes' funding has relied almost entirely on regional rates and the contribution of directly-benefiting property owners, via targeted rates.

By comparison, internationally, including in Europe, Australia⁴³, and the UK⁴⁴, most developed countries currently have substantial levels of central government funding for flood protection activities. This recognises the national benefits they provide⁴⁵. More multi-tiered international jurisdictions also have State as well as Federal co-funding with local authorities. It is now timely for New Zealand's government to draw from these models and reconsider the very valid reasons why it initially shared in the cost of flood protection.⁴⁶

Current central government role in flood protection

Central government currently has just two roles with effect on the protection of communities from flooding. Firstly, it has an enabling role - to ensure regional councils have the legislative power to manage hazards, including flooding. This legislation includes the Local Government Act 2002, Resource Management Act 1991, Soil Conservation and Rivers Control Act 1941, Drainage Act 1908 and the Civil Defence and Emergency Management Act 2002.

Secondly, when an event occurs of a size beyond local government's ability to cope, central government assists with response measures. It also provides financial assistance to speed up recovery.⁴⁷ This assistance is as per the parameters described in the National Civil Defence Emergency Management Plan (2006). For example, if a major flood damages critical infrastructure, then central government will meet up to 60 percent of the asset's repair cost, once damages reach a certain threshold.⁴⁸ Event responses also require ramped up activities and support from MSD, MPI, EQC, NEMA and health agencies.

Central government's role for the last three decades has been focused on disaster response, relief, and rehabilitation rather than as a preventor of damage. Central government's current role may therefore be viewed as more of the 'ambulance at the bottom of the cliff' than as a funder, protector, and advisor at the 'top of the cliff'. Funding assistance to communities is generally applied after the event rather than before the event.⁴⁹

Just as is the case with overseas jurisdictions, and consistent with the advice of the Productivity Commission,⁵⁰ central government must also now shift its focus toward partnering with regional councils to grow the 'first line of defence' role played by flood protection schemes.

⁴³ On top of existing 'state' contributions, the Australian Productivity Commission (2019) recommended the Australian government increase annual mitigation funding contributions to state and territory governments by \$100 million in the first year, then to \$150 million in the second year and \$200 million in the third year

⁴⁴ In the United Kingdom the current Environment Agency programme, which runs from 2015-16 to 2020-21, includes 1,136 flood and coastal erosion projects at a projected total cost of just over £6bn.

⁴⁵ Central / provincial government responsibilities in Europe vary from those applied in New Zealand. The principle emphasised here is that European countries tend to give higher recognition to the national benefits of river management for flood protection than in New Zealand. New Zealand could learn from their approach.

⁴⁶ New Zealand is now well beyond the need to apply the funding principles applied during the period of 'Rogernomics.'

⁴⁷ Government may also provide aid to parties affected by flood events within the terms and conditions defined in the On-Farm Adverse Event Recovery Policy administered by the Ministry for Primary Industries.

⁴⁸ We understand this level of assistance is now under review.

⁴⁹ For example, research funded by central government through the science system provides some guidance to the flood protection role played by regional councils.

⁵⁰ Productivity Commission, Local Government Funding and Financing, 30 November 2019.

Potential changes to central government flood protection responsibilities

Central government have commenced developing a refocused approach toward natural hazard policy. One of the stimulants for this was a 2020 review of the Resource Management Act (RMA) carried out by a Panel chaired by Retired Court of Appeal Judge Tony Randerson QC. Based on the Panel’s advice, Government now propose replacing the RMA with three new pieces of legislation.⁵¹ These are the:

- Natural and Built Environments Act (NBA Act).
- Strategic Planning Act (SPA Act).
- Managed Retreat and Climate Change Adaptation Act (CCA Act).⁵²

The new legislation is intended to overcome ‘RMA problems’ by, among other things, giving more prominence to the need to address natural hazard challenges. Solutions are proposed to be put in place by, among other things:

- Establishing a binding set of positive **national outcomes** and priorities for natural and built environments rather than using the ‘effects management’ regime entrenched within the current RMA.
- Recognising the concept of Te Mana o te Wai and the need for more active involvement of mana whenua in resource management decision-making (including that related to the protection of communities from the effects of flooding).
- Providing better national direction by preparing a robust **National Planning Framework** that will include content about the management of natural hazards and climate change.
- Giving more recognition to the need for Plans – including newly proposed regional spatial plans, to provide for adaptation to climate change, the avoidance of the risks arising from natural hazards, and better mitigating the emissions contributing to climate change.

The need for a comprehensive approach to flood risk management is clearly encompassed in the above advice (figure five⁵³). In recognition of this, regional councils have embraced and are actively applying a more comprehensive approach (figure six) to flood protection than in the past. However, they argue that providing protection by building resilience into existing flood protection schemes must remain a clear, prioritised and strong tools in the toolbox for achieving these proposed legislative requirements.

One of the proposed ‘National Outcomes’ likely⁵⁴ to be included in the Natural and Built Environments Act will address natural hazards and climate change. The proposed new Act will likely require the National Planning Framework and by implication, all local authority resource management plans, to promote measures to ensure significant natural hazard risks are reduced and the resilience of the environment to natural hazards and the effects of climate change are improved. This is a necessary and supported change.

DIA have played an active role in the first ten months of 2021, alongside regional councils, to develop potential flood-related natural hazard content for inclusion in the proposed National Planning Framework.

⁵¹ Cabinet Paper, December 2020.

⁵² This Act will be developed in 2023. However, the Climate Change Response (Zero Carbon) Amendment Act 2019 requires MfE to lead the process of preparing a National Adaptation Plan. Details about what it may contain are currently uncertain. Regional councils are of the view that the Plan should record flood protection schemes as the critical tool for assisting communities to adapt to the effects of climate change.

⁵³ This diagram was prepared by DIA and was included in a presentation to MfE and regional council river managers (3 November 2021).

⁵⁴ An indication of what may be included in the Natural and Built Environments Act was revealed in an exposure draft released in August 2021.

In November 2021, responsibility for further developing the ‘natural hazards’ content of the proposed National Planning Framework was transferred to MfE. In making this transfer, DIA provided the following advice to MfE about how to best address flood protection schemes going forward:

- Take a ‘systems approach’ to flood risk management with greater integration of existing policy and practice on a range of fronts.⁵⁵
- Use regional spatial planning strategies under the SPA to integrate flood risk management and climate change adaptation with strategic growth planning to enable future development to be risk-informed, climate resilient and sustainable.
- Set out where flood risk reduction will be prioritised over other outcomes.
- Provide for the maintenance of flood protection schemes⁵⁶ and adaptation for climate resilience.

Regional councils endorsed this advice.⁵⁷ What remains most salient in the above supported advice is DIA’s clearly stated recognition of the importance of the foundation stone protection provided to communities by the existing 367 flood protection schemes. The recent passing of the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act compounds this challenge.⁵⁸

The challenge for both central and local government to now address is how to secure the funding to enable these foundation stones to be maintained and adapted to the changed operating environment. A solution to this challenge is critical if our communities are to withstand the increased frequency and magnitude of current and future ‘climate change influenced’ floods. In support of this point, DIA noted⁵⁹:

- Local government should not be required to meet the costs of developing and maintaining flood protection works on their own.
- Repeat flood events are a challenge for central government to respond to.
- Insurers are moving to risk-based pricing and will withdraw and / or increase flood insurance in high flood risk areas.
- Co-investment will be needed by central government to support local government investment in flood protection infrastructure, adaptation for climate change and retreat, and for upgrading schemes to meet new environmental and cultural requirements set by the National Planning Framework.

Central government’s application of this refreshed thinking to the funding models for flood protection was recorded in the July 2020 Cabinet paper ‘Improving Resilience to Flood Risk and Supporting Covid-19 Recovery.’ This Cabinet paper noted:

⁵⁵ Investing in risk reduction through land use planning has been shown to be one of the most effective policy levers to reduce risk. Providing co-investment for flood protection helps with existing development but stronger national direction to limit new development in high-risk areas is agreed as being a necessary accompaniment to central government co-investment in flood protection.

⁵⁶ This underlining has been included by us to give this point necessary emphasis.

⁵⁷ This endorsement was provided by means of the active involvement of the River Managers SIG in DIA workshops and via submissions on draft documents.

⁵⁸ Government’s Resource Management (Enabling Housing Supply and Other Matters) Amendment Act provides for significant intensification in Christchurch, Auckland, Wellington, Hamilton, Tauranga as of right. This will come into effect in August 2022. This will increase risk as it will allow for three dwellings on sites where there is currently one. There is some provision for exclusion of areas where there are natural hazard risks, but it is not clear how this will play out. Many of these cities have large areas of land that are prone to flooding from major rivers.

⁵⁹ This information was included in an A3 shared by DIA with river managers and MfE on 3 December 2021.

- Current funding arrangements for flood protection infrastructure were established over 30 years ago and they are no longer considered sustainable or consistent with delivering outcomes in line with (the) proposed framework and principles.
- Subject to further work, central government’s funding approach to building resilience should consider the benefit principle, fairness, and intergenerational wellbeing.
- Officials will work with local government to develop a revised funding model for flood protection, based on the proposed framework and principles, which would be implemented over the longer term.

Regional councils welcomed the above commitments. They were therefore very disappointed to receive notice from DIA (June 2021) that further work on developing a co-investment framework for flood protection schemes had been suspended.

Notwithstanding, the proposed principles included in Appendix B of the July 2020 Cabinet paper remain valuable. The paper refers to an intention to use these principles to underpin the framework for central government’s role in strengthening community resilience to flood risk by intervening where there is a national interest or national benefit. More explicitly, the appendix states an intention to:

- Target action where national assets and national interests warrant central government intervention and funding.
- Intervene in projects where there is a significant economy of scale or time constraints, distributional concerns, to protect health and safety, and to protect kaitiakitanga.

What is requested is the opportunity to urgently⁶⁰ work with central government to apply these principles, alongside the guidance offered in the previous regional council business case,⁶¹ to develop a flood risk funding model that will provide co-investment support to regional councils and their communities to further enhance flood protection schemes.

Protection of Crown assets, values, national interest, and resilience – and the need to reduce Crown contingent liabilities

The cost of flood events may be counted not just in terms of the cost of replacing or restoring privately owned buildings and overcoming other property losses. There are also other tangible costs. These include the number of hours or days businesses cannot operate at full production and the cost of disruptions to the functionality of Crown assets.

In addition, flood costs have both an immediate and sometimes an on-going effect on people’s lives. This includes the effect on the willingness of the residents affected by flooding to continue to live and invest in areas subject to flooding.

To avoid a worst-case flood disruption scenario, scaled-up central government and regional council investment in flood protection schemes is required. The priority reason for this co-investment is to create resilient communities and sustain economic enterprise.

⁶⁰ The 2021 Westport, Marlborough and Canterbury floods display the fact that the challenge is real and present.

⁶¹ These are summarised in the executive summary and again toward the conclusion of this report.

All levers and tools are needed to reduce flood risk

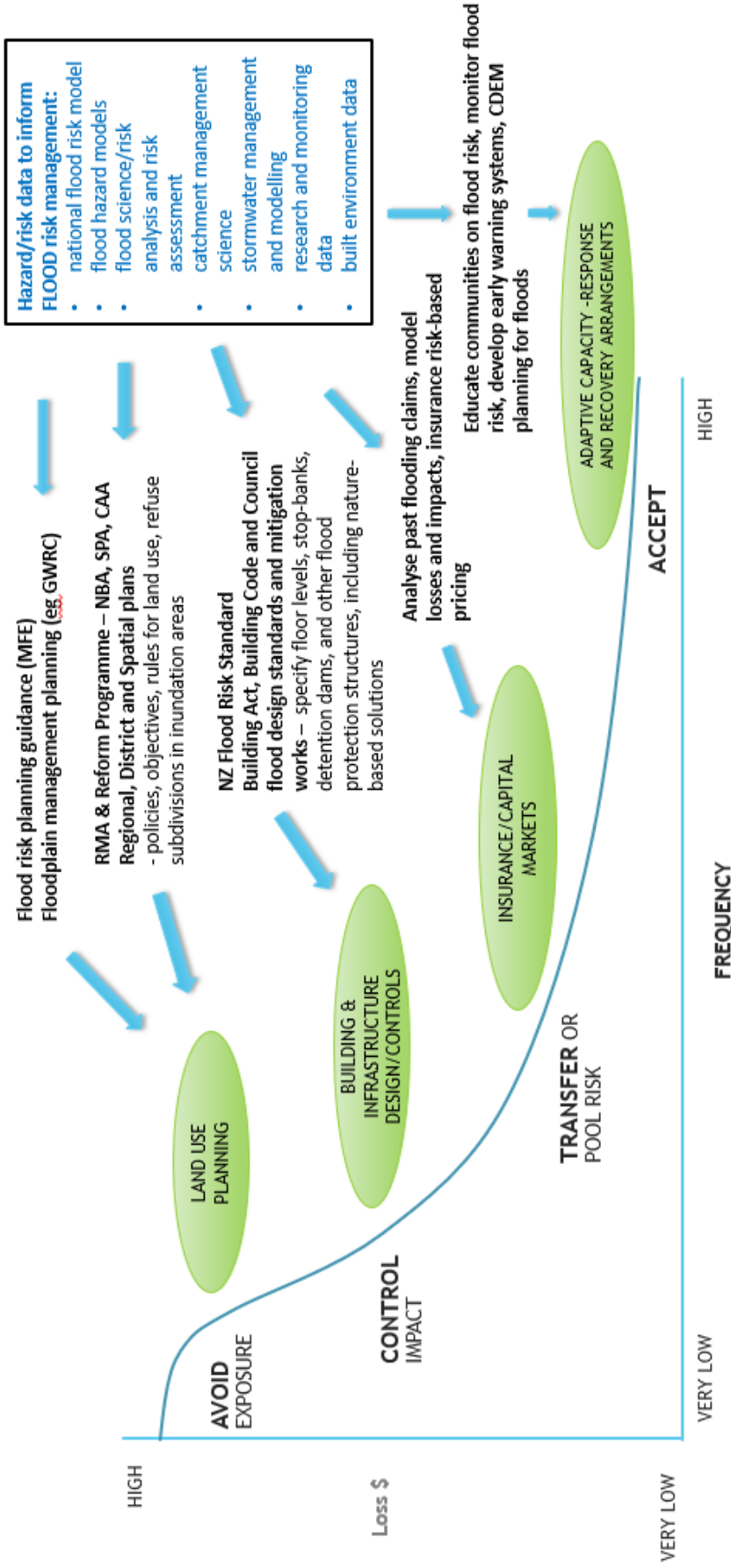


Figure five: Comprehensive approach needing to be applied to address flood protection challenges – as prepared by DIA (NB the blue circle has been highlighted by us to draw attention to the on-going critical importance of flood protection tools)

Multi-spectrum approach to building community resilience against flood risks

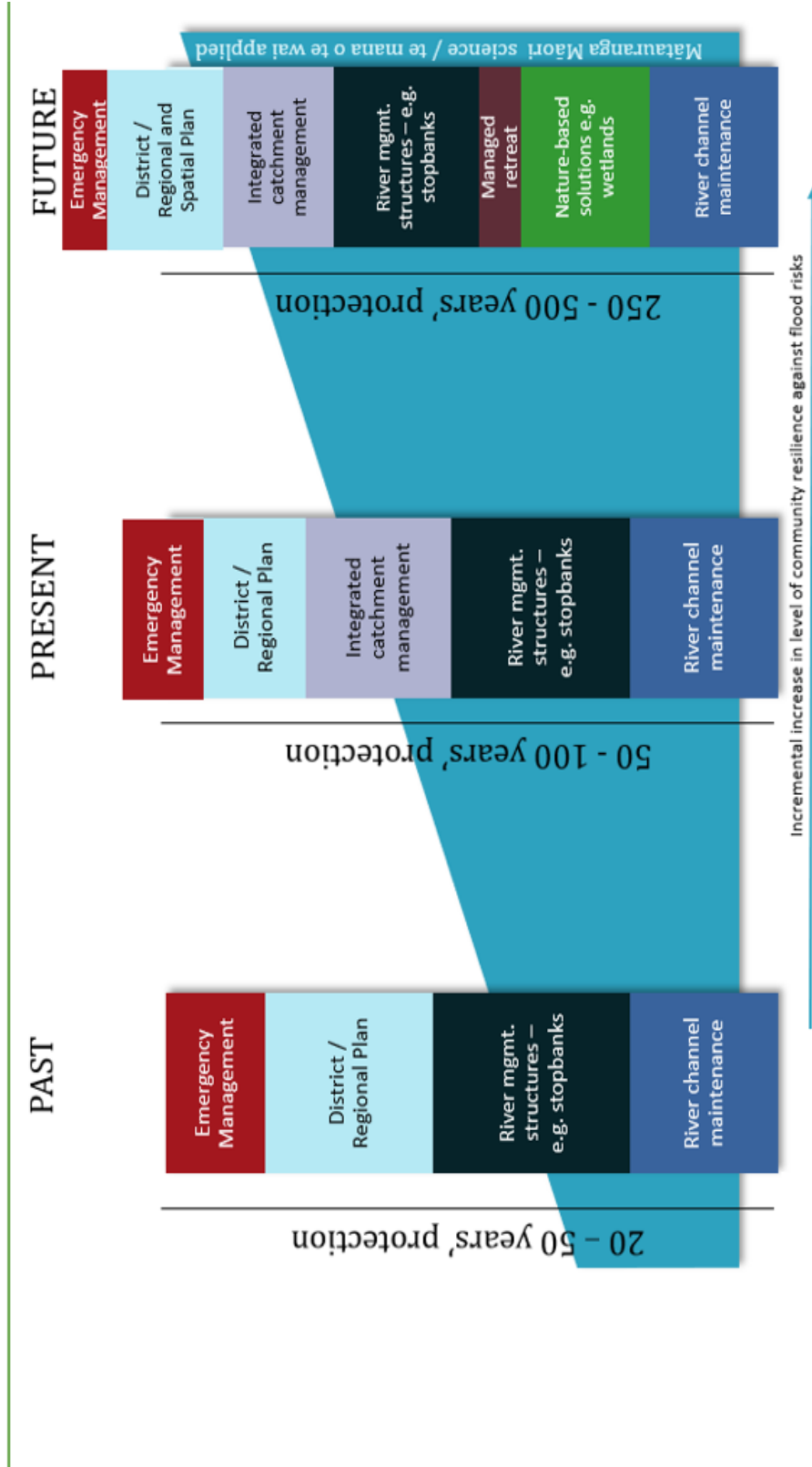


Figure six: Evolution of regional council approaches to flood protection

Companion objectives affecting the design of future flood protection schemes include the degree to which they may:

- Support well-functioning ecosystems.
- Improve water quality.
- Satisfy the expectations of our communities and Māori / iwi partners that our rivers will be managed as national treasures.
- Achieve integrated land use.
- Better reflect iwi / Māori / te Mana o te Wai and community aspirations about the management of natural systems.

Higher levels of resilience against the risks of extreme floods will also contribute to a full suite of other Government objectives, including investment certainty and social cohesion. These benefits will be expressed in all regions, not just the 'richer' regions.

One of the effects of central government's current narrow 'response-focused' role is that, for three decades, Crown owners or Crown infrastructure agency owners, have been able to enjoy the benefits of the asset protection provided to them by flood protection schemes at the cost of regional and targeted local ratepayers. Using local authority property-based rates to fund the protection of Crown assets is plainly unfair.

These protected assets include rail and road infrastructure, lifeline infrastructure such as power lines, some airports,⁶² communication services, schools, hospitals, universities, and public conservation land. The Crown also has substantial contingent liabilities in respect of non-Government owned assets such as local roads where it has funding responsibilities. In addition, if adequate protection is not provided to public and private assets, when major disasters occur, the Crown becomes the funder of last resort to restore community functionality.

Estimates⁶³ show that for floods in Nelson and New Plymouth in 1970 and 1971, losses associated with central government works and services (roading, railways, bulk power supply, flood control and drainage works) amounted to 49 per cent of the total value of all direct losses.

A further example is provided by the 2006 Dunedin flood. The Leith Flood Protection Scheme plays a large role in protecting the Dunedin CBD from flooding. This includes the protection of education facilities (University of Otago and Otago Polytech) and the protection of the new Dunedin hospital, public reserves, residential and commercial areas. The capital value of the Crown properties and non-relatable University land and assets in the area protected by the Scheme is 35 per cent of the total assets in the area.

Further examples of the direct benefits provided to central government may be drawn from Ashburton, Blenheim / Marlborough District and Westport. These three areas were all subjected to extreme flooding in 2021. Details about these case studies follow.

Live examples of the importance of the Crown being at the 'top of the cliff'

Ashburton flood event – June 2021

Across the Canterbury region, there are 110,000 houses located in flood hazard areas. These houses have an estimated replacement value of \$34 billion. The region has 112 km² of land at risk from

⁶² Airports such as those at Christchurch are located on flood plains. Many New Zealand airports are 50% owned by the Crown.

⁶³ Ericksen (1986) cited by the NZIER (2004).

flooding. The region also has 3,900km of roading, 800km of national grid lines, 2,204 of drinking water supplies, and nearly 3000 km² of dairy and pastoral land.⁶⁴

Over the three days from 31 May to 2 June 2021, the Canterbury region experienced 551mm of rain, with the greatest intensity experienced in the Canterbury foothills. The event was characterized as a 1:200-year flood event in the foothills and a 1:50-year event towards the coast (see figure seven).

Met Service’s ‘Ensemble Forecast System’ found that compared to a climate system unaffected by human activities, between 10 and 15 per cent more rain fell in this period than usual. Using a large collection of global climate model simulations, they also found that these events are at least 20 per cent more likely to occur today than in preindustrial times when the atmosphere was about one degree colder.⁶⁵

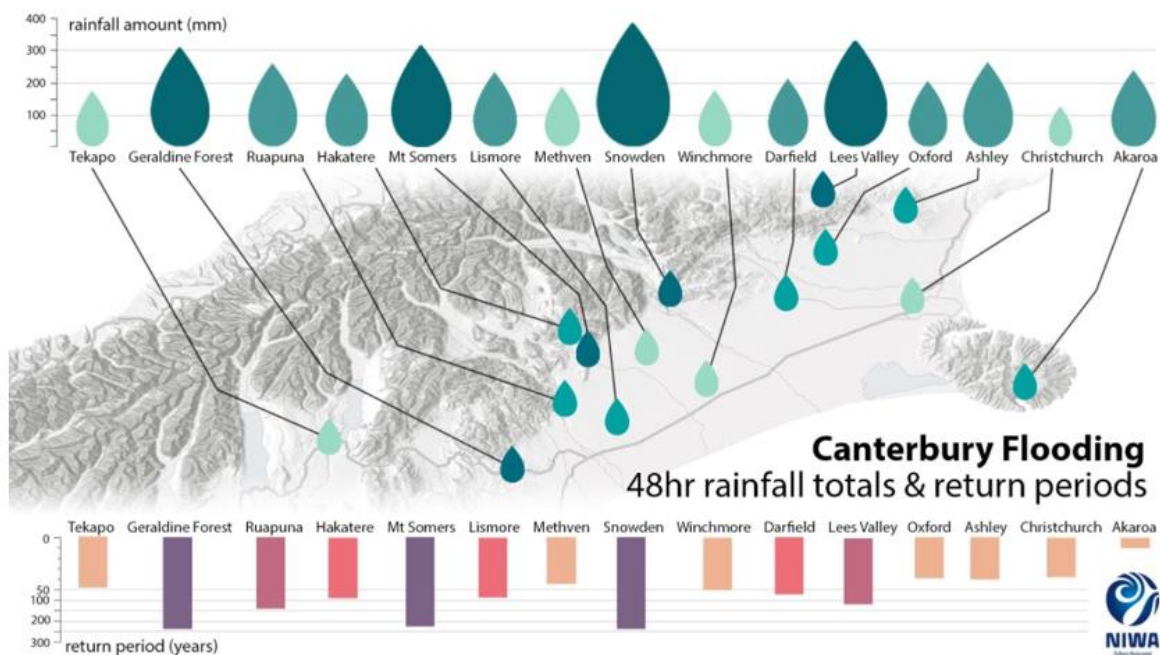


Figure seven: Canterbury rainfall event, 31 May to 2 June 2021, NIWA

River flow data showed a peak flow of 1,794m³/s in the Ashburton / Hakaterere River at the State Highway One gauge. This is the highest flow recorded at that site since the gauge was installed. A total of 558 response ‘needs assessments’ were carried out by local authority and civil defence personnel and over 200 households / 300 persons were evacuated from five main locations around the district. All but 18 persons were able to return to their homes. A total of 32 houses were damaged by flood inundation. \$5m of damage was done to local roads.

The town of Ashburton was saved from greater damage by a well-designed urban flood protection scheme. Further damage was averted by timely community leadership. The \$2.5m spent a decade ago on upgrading the stop banks on either side of Ashburton town proved their value. There was little damage to residential properties in the town and no loss of life.

The focus of the flood event impacts was in rural areas, particularly in the Canterbury foothills around Mt Somers and on intensively farmed land between the two branches of the Ashburton / Hakaterere

⁶⁴ The information provided in this case study was drawn from a report prepared by Pam Johnson from DIA.

⁶⁵ <https://www.stuff.co.nz/environment/climate-news/127210511/climate-change-made-the-may-flooding-in-canterbury-more-severe--researchers>

River. The two branches of the Ashburton / Hakatere River both suffered over-topping of stop-banks. This caused significant flooding because the event was “over design”. This means there was more water than the flood protection scheme was ever designed to handle.

Farmland and rural infrastructure were damaged. This included damage to fences, bridges, irrigation equipment and stock feed etc. The safety of animals was placed at significant risk. Some evacuations were required in small rural communities including at Springfield in the Selwyn district. Other rural areas, such as Hinds, were also cut off.

State Highway One, the primary transport route for southbound travellers and freight, typically has around 24,000 vehicles per day going over it, including 2,000 trucks. Over 30,000 vehicles cross in weekends. The bridge was closed because of concerns about bridge damage and structural stability. Alternative routes south (including the rail line) were also closed by the flooding. This impacted supply chains to the whole of the lower South Island⁶⁶ with significant but difficult to accurately quantify impacts on the economy.

Nevertheless, the event gave rise to 3,800 insurance claims from the Ashburton district requesting \$46.4m. The main claims may be broken down as follows:

	<i>Number of claims</i>	<i>Cost of claims \$</i>
<i>Domestic</i>	2,446	\$22,218,746
<i>Commercial/material damage</i>	889	\$18,625,320
<i>Business interruption / loss of profits</i>	57	\$1,050,779
<i>Motor vehicle</i>	302	\$1,816,351
<i>Other</i>	82	\$2,717,521
Total	3,776	\$46,428,717

Crown-owned assets located in the Ashburton district total over one billion dollars in value. These may be categorised as follows⁶⁷:

- Urban land and buildings \$36m
- Rural land and buildings \$10m
- Roads \$685m
- Rail tracks \$258m
- Transpower lines \$28m
- **Total** **\$1,100 million**

The total value of land and buildings on the floodplain in the Ashburton district is \$4,867m.

The Ashburton / Hakatere river’s control works consists of 76km of stop banks valued at \$17.6m and other tree, rock, culvert, and flood gates valued at \$62m.

⁶⁶ This was the second time that state highway one had closed due to flooding in recent times. In addition, the Rangitata bridge closed for three days in the December 2019 flood event.

⁶⁷ The dollar value of ‘damage to assets avoided’ has been calculated using 2020 dollars by applying level of service and scheme rating multipliers at a catchment level. This method of calculation was developed by economist Julian Williams using methods initially applied by Tonkin & Taylor - as included in their 2017 report “Hiding in Plain Sight”. The method uses the capital value (rating data) of government owned property such as schools and hospitals and lineal distance in km times per km rate of national infrastructure networks (road, rail, and national power lines). For example, the current cost estimate to build 1 km of state highway is approximately \$50 million.

These protection works generally provide benefits of protection to central government assets that vastly exceed their costs. The works are usually designed to provide a one in 50-year return frequency level of protection to rural areas inland from Ashburton and a one in 200-year return frequency level of protection around the township of Ashburton. As noted previously, the storm exceeded the design limit of the protection works located in rural areas but provided good protection to Ashburton town.

Other expenses will be incurred by both Environment Canterbury and NEMA⁶⁸ to restore flood protection scheme infrastructure and related vegetation (figure eight). The ratepayers of Canterbury will be required to meet unbudgeted flood recovery expenditure of around \$12m.

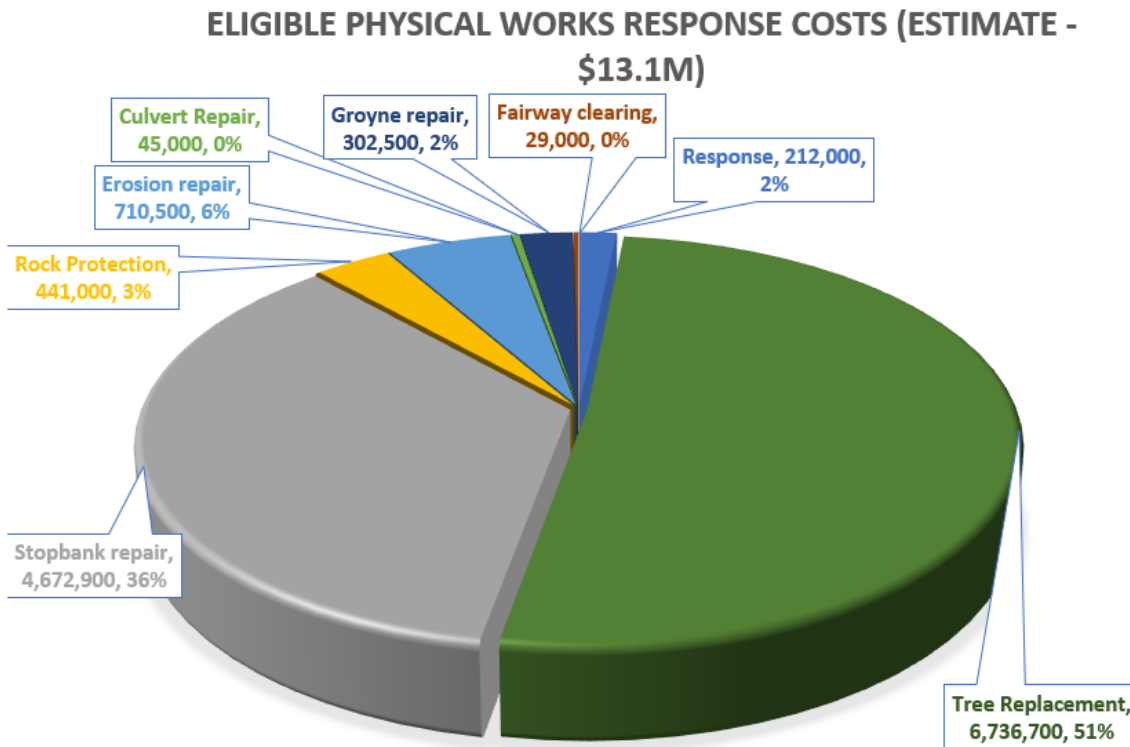


Figure eight: Environment Canterbury physical works ‘response’ cost estimates.

Similar, but not quite as intense flood impacts were felt in Selwyn, Waimakarere, Mackenzie, and Timaru districts.

The future state of affected Canterbury braided rivers may well be quite different to that existing prior to the June 2021 flood. This is not just because of the effects of the flood but also because of a need for Environment Canterbury and affected communities to consider the balance to be found in rural areas between:

- Providing for the tangible and intangible benefits of giving a stronger focus to river ecosystem and Te Mana o te Wai principles.
- Allowing the river more room to be a river.
- Affording the ratepayer cost of the capital works required for flood protection schemes capable of providing more than a 50-year level of protection.
- Meeting land use and ownership expectations, noting these include desires to have the opportunity for extending farming operations near river flood channels

⁶⁸ NEMA contributions are made at an average of 60% via their emergency response and recovery funding.

- Providing a fair and reasonable transition pathway, if it is agreed that intensive farming at these locations cannot continue.

Allowing the 'river to move' is a key challenge in some parts of the Ashburton catchment and elsewhere. The North Ashburton / Hakatere River narrows from around 300m between stop banks at Thompson's Track to 100m between stop banks at Shearers Road. Similarly, the Orari River narrows from around 650m between stop banks at Geraldine to around 250m near the coast.

These challenges are not matters upon which relief is sought with the assistance of central government co-investment. They are challenges, nevertheless, with farmer expectations about bedload gravel management being a salient sub-set of these issues. Regional councils are prepared to meet these challenges by encouraging managed retreat and other land use / spatial planning, where that is appropriate. In other instances, it may be the case that local landowners will increase their funding toward the achievement of a higher-level flood protection.



Rural parts of the Ashburton / Hakatere River, 31 May 2021. (Photo courtesy of Stuff).

Westport flood event – 20 July 2021

A West Coast Regional Council catchment weather station recorded 730mm of rain in the 48 hours extending through 19 / 20 July flood period. NIWA records show the last time the Buller River reached the heights experienced in the July 2021 flood was in 1926. The 7,640 cubic metres per second recorded on 20 July 2021 was the largest direct measurement of flow ever recorded in New Zealand.⁶⁹

The cost of recovering from the effects of the Westport flood have been estimated at close to \$100m. The flooding left 23 per cent of Westport's housing stock in need of repair. A total of 71 homes were severely damaged and deemed unsafe, while a further 388 homes will require significant repairs.⁷⁰ Over 1000 insurance claims were lodged.⁷¹ A total of 2,000 Buller district flood damaged properties were assessed by the Council's Emergency Management team (figure nine).

⁶⁹ An article authored by scientists D. A Stone et al, as included in the journal 'Weather and Climate Extremes,' March 2022 (as quoted by Auckland Herald reporter Jamie Morton on 10 March 2022) found the planet's warming made the July 2021 West Coast weather event 10% more intense than would have occurred without climate warming.

⁷⁰ 'Development West Coast' Chair Renee Rooney described the flood as 'a devastating blow to Buller, damaging homes and farms, and causing much disruption to the region'.

⁷¹ CEO Tim Grafton, Radio New Zealand, 20 July 2021.

Investment of between \$10m and \$20m in a flood protection scheme would likely have prevented this damage and avoided these recovery costs being incurred (figure ten).

Crown-owned assets in the Westport area, at risk of damage by flooding from the Buller River, may be categorised and valued (\$2020) as follows:

- Urban land and buildings \$15m
- Roads \$730m
- Rail tracks \$235m
- Transpower lines \$13m
- **Total** **\$1,000 million**



Figure nine: proposed flood protection structures for Westport. Source: West Coast Regional Council.

Additional protection to Westport communities may be provided by applying adaptation, ‘working with nature’ systems, relocation options, raised building floor level heights and other approaches. The relocation option involves shifting further development away from the potential flood zone to the area south-west of the current Westport township. This may be described as a multi-tool approach (figure

eleven). Adaptation options include improving the efficiency of the Orowaiti River as an overflow channel (and potentially creating an ecologically rich wetland), reducing the flow-constraining effects posted by State Highway 67 and Kiwi Rail structures in some areas.

Considering the extensive damage that occurred to Westport in July 2021, what is now taking place is a multi-party process to reach agreement on a carefully phased and central government ‘co-funded’ approach to the rebuild of community resilience against flood risks at Westport. Flood protection structures must be at the centre of this process. Work undertaken by West Coast Regional Council recommends immediate expenditure of \$10.2 million on these structures.

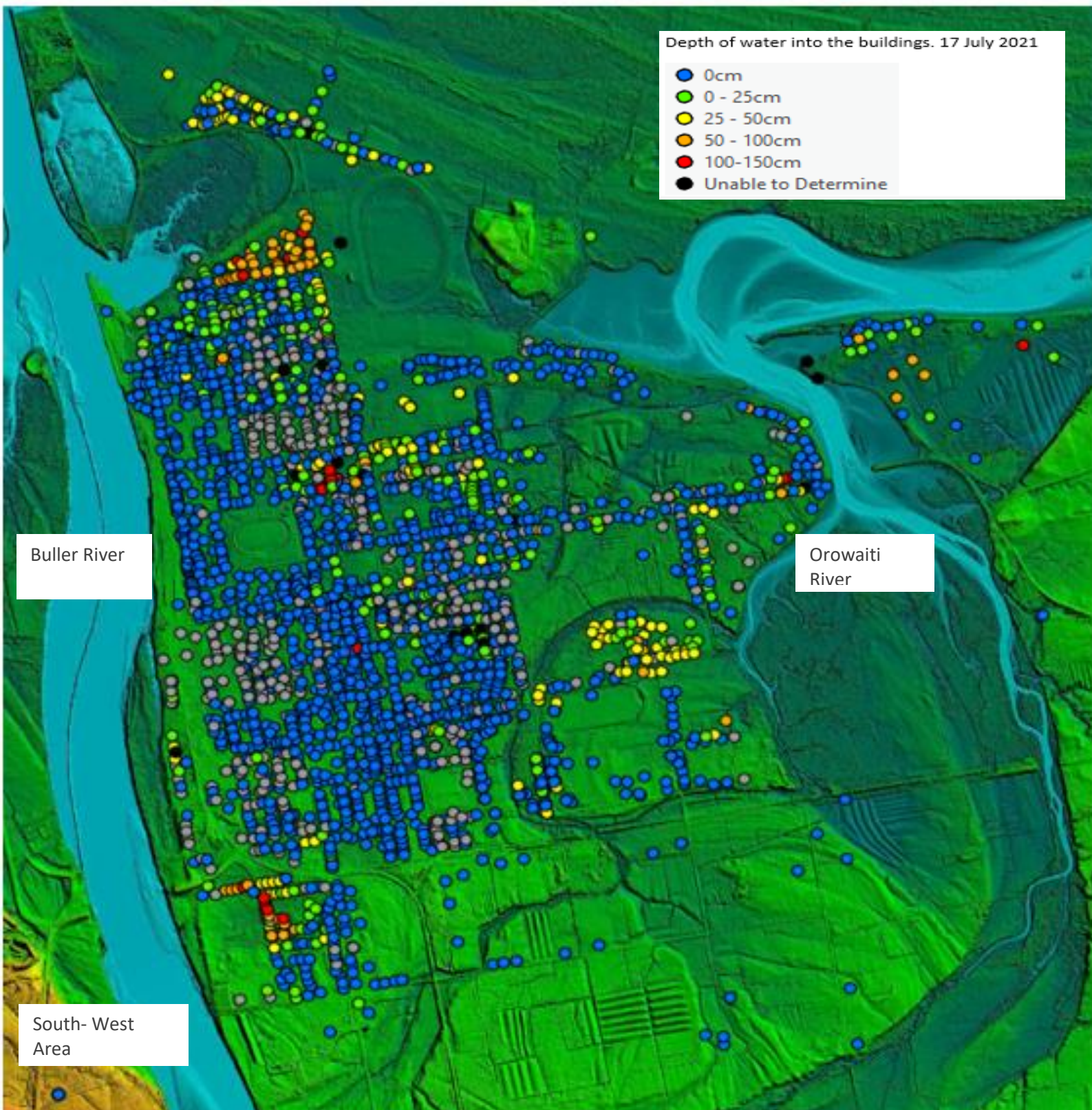


Figure ten: Inundation depth of buildings affected by Westport flood 17 July 2021: Source – West Coast Regional Council

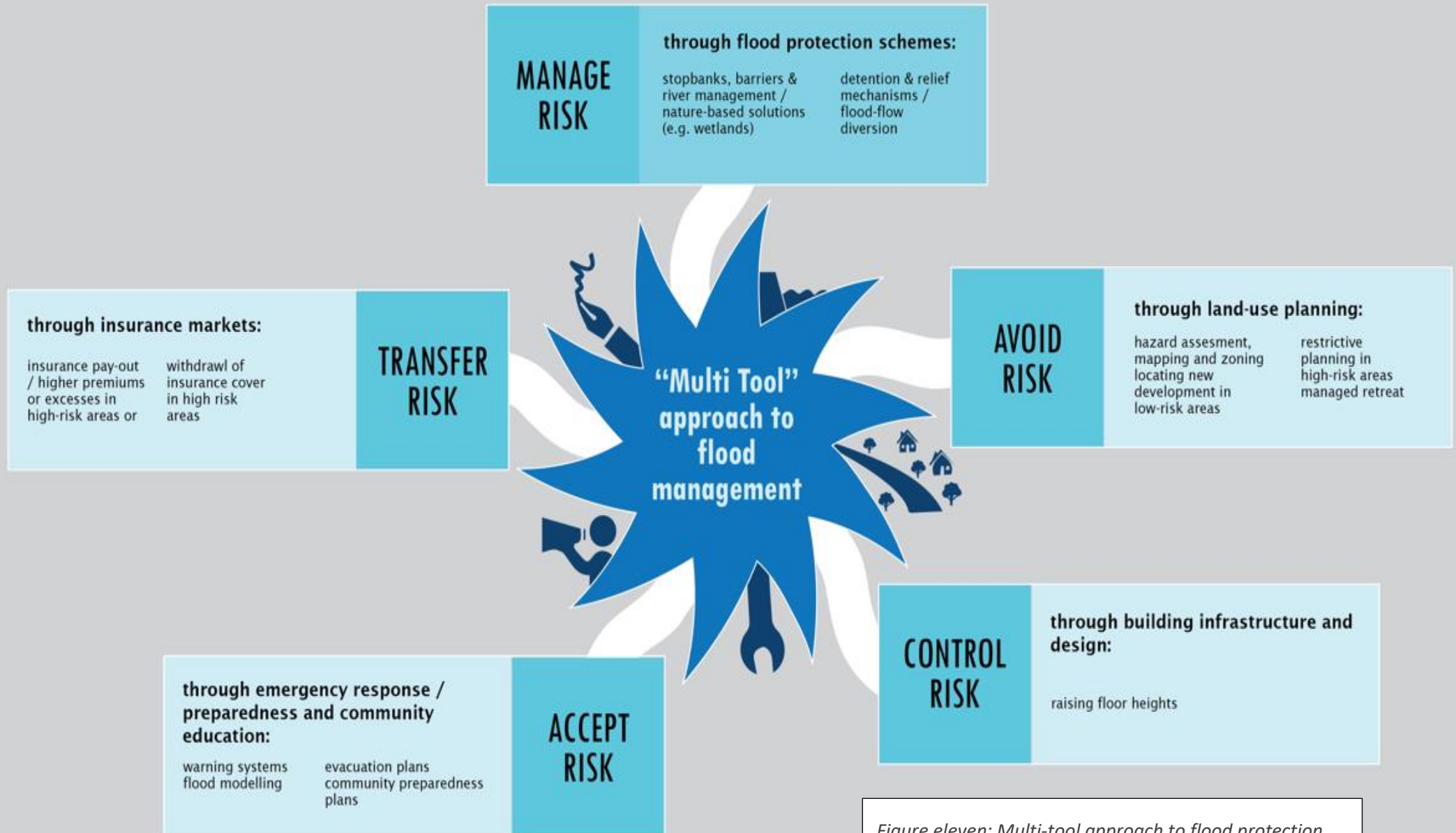


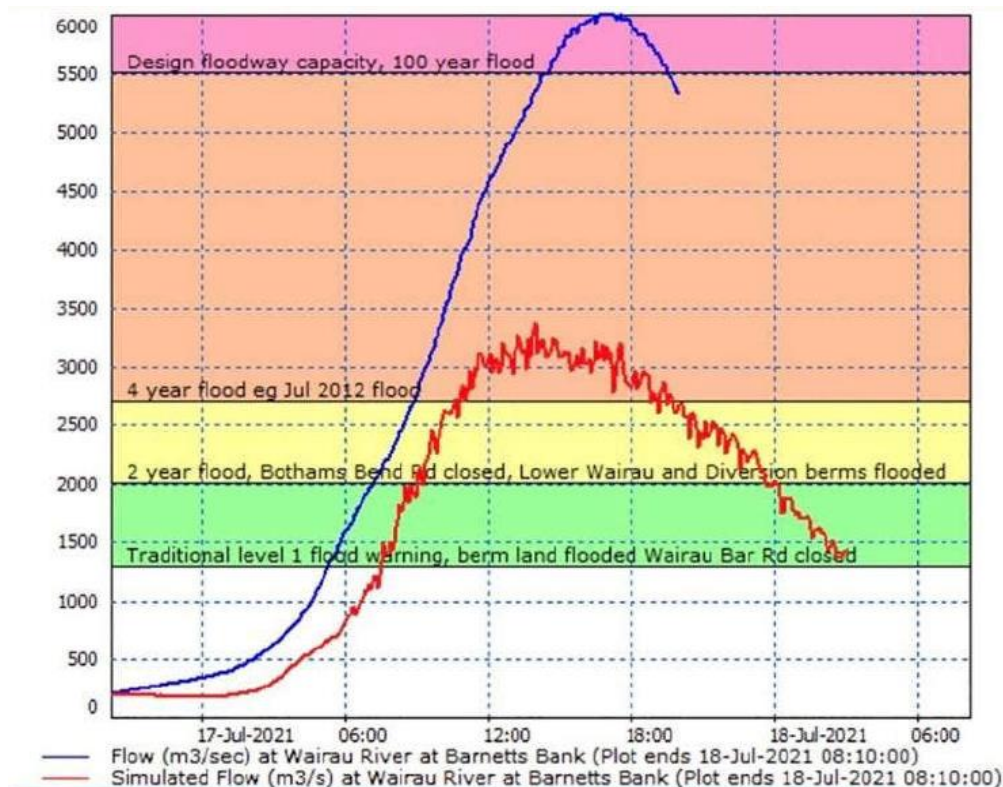
Figure eleven: Multi-tool approach to flood protection

Blenheim / Marlborough District

Almost 1000 people were evacuated from 500 properties and five people were rescued from parts of Marlborough town cut off by the worst flood ever recorded in the region. Evacuations at Spring Creek and Tuamarina were prompted by overtopping or breaching of stop banks on the Wairau River.

The effect of the flood event was exacerbated because of the flow constraining effect of the State Highway One bridge. Repairs amounting to \$12m to scheme structures are now underway. Blenheim was largely protected because of flood protection scheme works constructed after the devastating 1983 flood event. This scheme was constructed with 75% funding from central government.⁷² Hydrological analysis records the peak flow of the Wairau at Blenheim at 5200-5300 m³/sec, almost exactly a 1% Annual Exceedance Probability (AEP) event but slightly below the target scheme capacity of 5500m³/sec. (figure twelve).

The District’s engineer recommends a new flood protection scheme peak flood capacity design is required for Marlborough’s growing population, intensified land use patters - particularly viticulture, and to better manage the storm flow effects caused by climate change. The engineer suggests that such a step change will require a significant Crown involvement, both as a major infrastructure owner (including two key bridges) and as a funding partner. Excluding the cost of the replacement bridges (State Highway Six, State Highway One and the railway bridge), investment in the order of \$50 - \$100m may be required to make this step change.



⁷² This scheme is currently being enhanced with the assistance of a \$3m 'shovel ready' central government grant.

Figure twelve: Wairau River flow 17 / 18 July 2021 (Source – Marlborough District Council).

Crown-owned assets in the Blenheim, at risk of damage by flooding from the Wairau River, may be categorised and valued (\$2020) as follows:

- Urban land and buildings \$68m
- Rural land and buildings \$51m
- Roads \$556m
- Rail tracks \$121m
- Transpower lines \$12m
- **Total \$808 million**

Implications that may be drawn from recent flood events

The main insight from the above three cases is that the Crown is substantially exposed to flood risk damage. The Crown assets with the biggest vulnerabilities are the extensive network of road and rail assets present in these and all areas subject to flooding throughout New Zealand.



Photo two: Westport flooding, 20 July 2021 (Courtesy of Anita O'Brian, Radio New Zealand)

In addition, damage to Crown land and buildings such as schools may cause on-going disruptions (indirect costs) to community functionality. Other indirect Crown benefits arising from flood protection schemes include the following:

- Fiscal revenue (taxes and excise duties) is maintained.
- Regional economic activity is sustained because infrastructure networks (road, rail, power, and communications) keep operating.
- Expenditure by central government departments (e.g., MBIE, MPI), to rehabilitate industries, is avoided (refer Ashburton Flood Recovery Plan 2021).
- Expenditure by central government departments (e.g., MSD, MoH, FENZ, NZ Police) on community welfare and safety, is avoided (refer Ashburton Flood Recovery Plan 2021).
- Investments made by central government as part of the Provincial Growth Fund are protected.
- Resilience and increased levels of safety and security is provided to existing and future businesses, individuals, families, and communities.

The wine industry in Marlborough, the dairy industry in Ashburton and the fruit and vegetable processing industry in Marlborough are examples of the ‘value-add’ economic contributions, of national importance, from each of these regions.⁷³ Existing flood protection schemes in Marlborough and Ashburton enabled the national importance of these industries to be protected from the full effect of the July 2021 floods. Westport industries were not so fortunate. Seafood processing is one of Westport’s main employers (120 employees in 2020). In addition, new initiatives, some of them established with the support of PGF-funded, were placed at risk. These included the high value tourism services provided by the Riverbank project and the Kawatiri Coast Trail. The PGF also supported the EPIC innovation hub and the development of a commercial fishing precinct.⁷⁴



Photo three: Marlborough / Blenheim Flood 20 July 2021 (Photo courtesy of Stuff)

Canterbury accounted for 26% of total NZ dairy cattle. Ashburton accounted for 7% of total NZ employment in dairy cattle farming. Of total employment in the fruit and vegetable processing, Marlborough accounts for 12% and Ashburton accounts for 11%. Marlborough accounts for 33% of total New Zealand employment in aquaculture.

⁷⁴ This precinct and the Westport Deepsea Fishing School are envisaged as providing further opportunity to take advantage of Westport’s competitive position in the commercial fishing industry.

Other reasons for co-investment by central government

Withdrawal of the insurance sector from flood protection

The other main implication that may be drawn from recent events is that the increasing frequency of severe floods is not on the horizon – it is with us now.⁷⁵ The examples clearly demonstrate the scale of central government expenditure on responding and recovering from these events. The scale of this expenditure would be significantly reduced with investment in proactive risk mitigation and resilience improvement.

Some insurance companies have now provided notice of their intention to raise their cost of providing insurance cover over properties subject to flood risk. Tower Insurance was the first to act.⁷⁶ They have now given notice to their New Zealand home insurance customers⁷⁷ about increases to the flood risk portion of their premiums. Other companies such as AIG will more than likely follow suit. There is also the possibility that some insurers may decline cover for those properties subject to higher levels of risk.

Tower Insurance’s proposed increases reflect a pricing model based on the individual risk faced by the property subject to damage by flooding⁷⁸. Properties are to be allocated a risk rating of low, medium, or high. One in ten properties will be subjected to higher premiums of about \$50 per year. Some property owners could see increases of several hundreds of dollars, upwards to \$1000, depending on the risk level, size, and location of their property. Crown properties and assets will be placed in the same position as private property owners.

Tower have said they had made these policy changes because they wanted to make sure people were aware of the options, they, councils, and government had at their fingertips to reduce risk, including elevating / raising the floor levels of homes. They noted available options for reducing flood insurance premiums clearly included constructing flood protection scheme infrastructure.

Tower also said that flooding events in the last 18 months in Northland, Napier, central Otago and big storms in Canterbury, Westport, West Auckland and more recently in Gisborne and the East Coast had all influenced their decision to increase premiums (figure thirteen).⁷⁹



Figure thirteen: The cost incurred by Tower Insurance in assisting insured property owners to recover from recent flood events.

⁷⁵ Climate change deniers may argue that several swallows do not make a spring – in this case several flood events are not a cause for alarm because they do not have statistical validity. This could not be further from the truth – as indicated by the Tower Insurance data provided below.

⁷⁶ Tower hold 10% of the New Zealand house insurance market.

⁷⁷ November 2021

⁷⁸ Tower Insurance have used a New Zealand inland flooding model based on simulations and probabilities of difference scenarios using data obtained from NIWA, LINZ, regional councils, and the Insurance Council of New Zealand.

⁷⁹ Auckland Herald, 10 November 2021.

In addition, Tower referred to data gathered by the Insurance Council of New Zealand dating back to the 1960s to justify their decision to increase premiums (figures thirteen and fourteen). This shows an increasing trend-line in terms of natural disasters, with almost half based around floods.⁸⁰

Of concern to Tower was not just the frequency of the floods but the severity of them. They noted, *'in the last 10 years the cost of flood damage was equivalent to the previous 45 years'*. They also noted that in the past 50 years, nearly half (45%) of all natural disasters – despite the effect of the Christchurch / Kaikoura earthquakes, were from floods.

The Insurance Council's CEO Tim Grafton telescoped the likely increase in insurance premiums in a radio interview immediately after the July 2021 Westport floods. He said, *'some flood-vulnerable communities would face difficulty getting insurance as risks of flooding increased'*. He advised *'the best path as being not just transferring risk to insurance but rather to control, adapt, avoid and be more aware (rather than be blindsided through lack of information) of the level of risk that was comfortable for each property owner to endure.'*⁸¹

Tower Insurance explicitly addressed this point in their recent announcements. They said that people who choose to raise the elevation of their house or be protected by flood schemes would be offered a reduced flood risk premium.

Despite awareness of the risks, some property owners will choose to not insure. The pressure and cost for local government to take preventative action will therefor increase. All 'response' actions will need to be considered by regional councils when considering their reactions to this pressure. This may include building relocation / managed retreat, requiring house floor levels to be lifted above minimum flood heights, and preventing further urban intensification in those areas subject to flooding.

The implications arising from Tower's decisions are large. Other insurance companies will inevitably follow their lead. The cost of property ownership will go up. This will remove discretionary income from other potentially more productive parts of the economy. Mitigation of flood risk by improving the integrity of existing flood protection schemes is a 'smart option' for central government and regional councils. This is better than passively accepting the obligation on the Crown and private property owners to pay insurance increases or in some cases to have to essentially act as default insurer.

In areas of existing concentrated urban development, the best option will, in almost all cases be enhancements to the level of protection provided by existing flood protection schemes. The integrity and the resilience provided by these schemes can be increased at modest cost when compared to the cumulative social, infrastructure, personal identity / security and crown-asset protection costs associated with managed retreat or raising the floor levels of potentially hundreds of buildings.

⁸⁰ Lyod's Global Underinsurance Report (2012) notes that New Zealand's local authorities operate in an environment that is highly vulnerable to natural hazard risks. New Zealand is rated as one of the most vulnerable economies in the world in terms of the impact of natural disasters, as a percentage of GDP.

⁸¹ Radio New Zealand, 20 July 2021

Inflation Adjusted Costs (\$m) for Flood & Storm Events

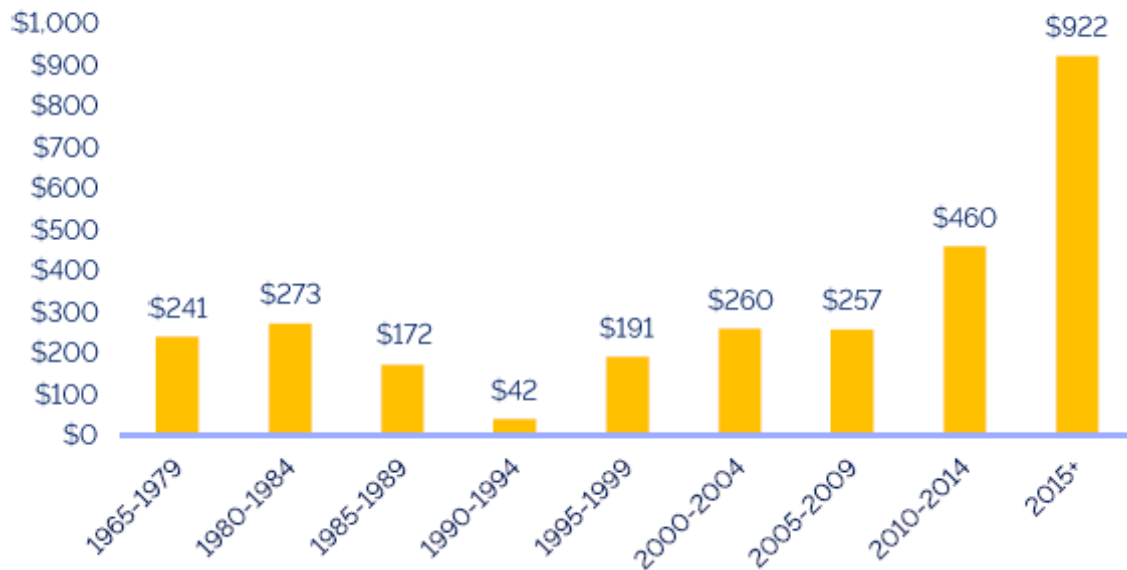


Figure fourteen: Data from Insurance Council of New Zealand about flood event costs incurred by the insurance sector

In this context, a NZIER (2020)⁸² report notes that mitigation can remove hazards whereas insurance cannot. They state *‘the case for mitigation depends on finding incremental reduction in exposure or vulnerability of human activities and infrastructure that avoids future hazard losses at low cost and with limited unintended effects. While insurance provides compensation for losses through risk transfer and is an important long-term element of risk management for New Zealand, it does not reduce the likelihood of such events or the risk of them happening again.* This NZIER report also noted that flooding hazards (when compared to other natural hazards) have the most scope for cost-beneficial mitigation.

Unfunded crown liability – responding after a flood event

The government’s ‘Thirty Year Infrastructure Plan’⁸³ records that the average annual costs of responding to flood events now exceeds \$50 million. While necessary, this is sub-optimal expenditure compared to preventative investment. As such, it does not minimise future risk to the community or central government and Crown assets. This ‘after event’ focus also means government bears an excessive unfunded future liability in its fiscal accounts.

The severity of the consequences of not securing and enhancing the integrity and service levels of existing flood protection structures, and the community resilience role they play, increases every day. The fiscal consequences for government of not proactively investing at the top of the cliff are growing at a similar rate.

It is fortunate that the 2021 floods in Ashburton, Westport and Marlborough district did not result in a loss of life. It is only a matter of time before lives are lost. This is an even bigger liability and responsibility for the Crown to carry.

⁸² NZIER, 2020. ‘Investment in Natural Hazards Mitigation – forecasts and findings about mitigation investment’, a report to DIA

⁸³ Treasury, Thirty Year Infrastructure Plan, 2015.

Treasury's Living Standards Framework

Treasury's Living Standards Framework has moved towards a 'four capitals' approach. These 'capitals' include:

- Natural capital, with reference to all parts of the environment needed to support life and human activity.
- Financial / physical capital, with a direct role in supporting incomes and material living conditions.
- Human capital, with reference to the things which enable people to participate fully in work, study, recreation, and society.
- Social capital, with reference to the norms and values that underpin society.

All elements of the new Living Standards Framework imply a need for more active investment by central government in the management of flood risks.

The Sendai Protocol

The Sendai Risk Management Protocols of the United Nations, to which New Zealand is a signatory, recognise the importance of investing in risk mitigation activities. The National Resilience Strategy developed by the Ministry of Civil Defence and Emergency Management aligns with the Sendai Protocols.

The Sendai Protocols reflect four priorities:

- Priority 1: Understanding disaster risk.
- Priority 2: Strengthening disaster risk governance to manage disaster risk.
- Priority 3: Investing in disaster risk reduction for resilience.
- Priority 4: Enhancing disaster preparedness for effective response and a commitment to "Build Back Better" as part of recovery, rehabilitation, and reconstruction.

As a signatory to the Sendai Protocol, these priorities clearly imply a need for central government to play a more active role in risk mitigation.

Productivity Commission – local government funding and financing

The Productivity Commission enquiry into local government funding and financing⁸⁴ selected flood protection schemes as an example of a function for a stepped-up co-investment-focused-arrangement between central and local government. The terms of reference for the enquiry, as issued by the Ministers of Finance and Local government, noted that:

- Local authority debt has grown steadily since 2006 to the point where some councils are now coming close to their covenanted debt limits.
- One of the major factors influencing local authority debt is the cost of adapting communities and infrastructure to mitigate risks and hazards associated with climate change.

The Commission favours the "benefit principle" as the primary basis for deciding who should pay for local government services. In this regard, the Commission noted *'some local assets and*

⁸⁴ Productivity Commission, Local Government Funding and Financing, 30 November 2019.

their associated services could benefit... national interests. In these cases, the benefit principle points to shared funding with a contribution from central government.

In addition, the Commission identified four key areas where the existing funding model is insufficient to address cost pressures:

- Supplying enough infrastructure to support rapid urban growth.
- Adapting to climate change.
- Coping with the growth of tourism.
- The accumulation of responsibilities placed on local government by central government.

All four of these identified areas support the need for co-investment by central government in flood protection schemes. In addition, the Commission suggested the Government should extend the role of the New Zealand Transport Agency (NZTA) in co-funding local roads. This should be to assist councils facing significant threats to the viability of local roads and bridges from climate change and / or to overcome the exacerbation of flood risks because of the narrowing of river channels because of these structures.

International precedent

President Jo Biden has introduced a \$1.76 trillion-dollar (NZ dollar equivalent) bipartisan infrastructure Bill to the US Senate calling for roads and power infrastructure to be made more resilient to storms.⁸⁵

In the United Kingdom, more than 1,000 flood protection schemes will benefit from a record investment of more than \$10 billion (NZ dollar equivalent) of investment over the next six years.⁸⁶

The Australian Productivity Commission has called for the Australian government to increase annual flood mitigation funding contributions to state and territory governments by \$100 million in the first year, then to \$150 million in the second year and \$200 million in the third year.⁸⁷

These important precedents present a model for New Zealand to follow.

Summary – reasons for central government co-investment

In summary, the reasons for a return to active central government co-investment in flood protection schemes are that it:

1. Is more fiscally responsible than focussing on post-event response and recovery.
2. Reflects Treasury's new performance measurement and Living Standards Frameworks.
3. Is supportive of wellbeing and social inclusion.
4. Has the potential to better reflect equity / ability to pay considerations at the heart of this government's election promises.
5. Is supportive of job creation and the potential to lift the productive potential of the regions.
6. Contributes to the security of the vital access routes (rail and road) for commerce.
7. Directly protects Crown assets.
8. Contributes to investment 'opportunity costs.'

⁸⁵ CNN, 2 December 2021

⁸⁶ UK government press release, 2 December 2021.

⁸⁷ This recommended 'federal' commitment is on top of commitments already made at the state and local levels.

9. Works against escalating insurance premiums and the risk of insurance companies failing to provide insurance cover in flood risk areas – with the long-term consequence of Government inevitably being required to step-up and stump-up to fill the gap occurring because of the absence of private insurance.
10. Contributes to the environmental and water quality expectations of our communities and iwi partners.
11. Provides for resilience and adaptation against the effects of climate change-induced ‘above-design’ storm events.
12. Above all else, provides resilience and increased levels of safety and security to existing and future individuals, communities, and businesses.

Moving forward

The options for the future funding of flood protection range from a ‘business as usual’ approach, to application of all the other options displayed in figures five and ten. These include better spatial planning to avoid flood hazards, managing the retreat of some communities from certain areas, to the construction of enhanced flood protection schemes, in association with whole-of-catchment solutions.

For all situations, options need consideration within the context of present-day reality and the circumstances applying at any one location. In most instances it is likely that the full range of risk reduction methods should be applied in tandem although as noted earlier, improving the integrity and capability of existing flood protection structures is in most instances, likely to be the most cost-beneficial and therefore priority intervention.

Do-nothing approach

Maintaining existing scheme service levels⁸⁸ is not tenable, nor practical, primarily because the influence of climate change is such that current levels of resilience will continue to be eroded. This, in turn, will result in:

- Increased risk to public and private local, regional, and national assets.
- Increased demands on emergency and recovery funding.
- Increased insurance premiums.
- Increased risks to public safety and a risk to life.
- Increased numbers of communities unable to get insurance and / or decreased insurance coverage.
- Increased community and personal hardship and distress.
- Increasingly negative impacts on local, regional, and national economies and the environment / ecological and iwi values.

⁸⁸ A ‘Service Level’ is calculated using one of three methods: a scope of physical works agreed with the affected community; or a scope of physical works with a target capacity e.g., a maximum channel flow and or a scope of physical works with a level of performance defined in terms of a target return period e.g., a one in one-hundred-year event.

Business as usual and do-nothing approaches are therefore not tenable. Regional councils know this. They have already committed to increase their level of future investment by \$25m per annum. They are also grateful for the ‘one-off’ \$217m investment made by central government into the 55 flood protection projects that were ‘shovel ready’ in 2020. However, there are many more scheme upgrade projects also requiring increased investment to meet future needs – with an estimated cost of \$150m each year. Central government should co-invest this sum by making provision for a line-item in their annual budgets. Responding to location-specific requests on an ad-hoc basis is not an appropriate way to address this challenge.⁸⁹

Community / managed retreat / planned withdrawal approaches

This option proposes to reduce risk by asking residents and businesses to withdraw from locations at risk of being flooded. As noted previously in this report, this relocation / managed retreat is extremely difficult - particularly when this involves established and well-developed urban communities. The sunk costs of existing investments are very large. Stranded assets will have zero value. The impact on landowners of moving, to allow rivers to flow more freely, will extend both upstream and downstream of the ‘run free’ location.

The social and political disruption and ‘stranded asset’ effects associated with this option are likely to make it unpalatable in most cases. Nevertheless, there will be some locations within catchment schemes where this solution may be considered an acceptable part of a more holistic approach.

Whole of catchment approaches

The desires of iwi / Māori, ecological considerations and the broader interests of regional and national communities are such that regional councils must apply their river management intentions in an environmentally benign / ecologically sensitive and whole catchment manner.

Integrated and sustainable land management or ‘whole-of-catchment’ approaches have always been a core part of regional council business. More substantial investment in whole-of-catchment solutions will be required in the future. Applying this option reduces the level of sedimentation, bed load deposition and erosion occurring within catchments. It also improves the water quality in rivers, estuaries and coastal waters and contributes to biodiversity values.

To successfully adopt and achieve a ‘whole-of-catchment’ approach requires extensive outreach work, including one-on-one collaboration with landowners. This is to help them become aware of how they may alter land use practices, adjust internal property infrastructure, and change the nature of the enterprises they apply to their land to achieve more holistic long-term water quality, soil, flood management and environmental outcomes.

Part of this work will involve planting trees. The one billion trees programme and carbon sequestration planting have played an important role in contributing to the outcomes sought from these ‘whole-of-catchment’ solutions. Other initiatives contributing to whole of catchment solutions include:

- Accelerating application of sustainable land use practices.
- Promoting the conversion of some areas from pastoral uses into indigenous forest.
- Promoting and co-funding more extensive riparian planting.

⁸⁹ The preparation of a business case and the provision of central government funding for a multi-tool assistance package for Westport will provide a useful pilot to guide the development of a comprehensive national / central government approach to co-investment.

- Accelerating careful consideration of the use of some areas for Mānuka planting and honey production.
- Promoting expanded plantation forestry in suitable locations.

The net effect of the above initiatives is that they will help to forestall the risk of transferring this generation's flood management 'challenges' into compounded problems for the next generation. Whole catchment approaches are therefore an essential element in the 'multi tool' approach to be applied to enhanced flood protection.

The new spatial planning and national planning tools, proposed as part of the resource management legislative reform programme, are also essential. Regional councils look forward to being active leaders and participants in the development and application of these tools, but they will not be enough on their own.

Enhanced flood protection schemes, in association with whole-of-catchment and spatial planning approaches

Sustainable land use is an essential ingredient of flood risk management. Investment in sustainable land use needs to be increased. However, no matter how successful sustainable land use tools may be, they cannot and will not be enough on their own to manage the impact of significant flood events. This is because more sustainable land uses will have only a minor effect on the increasing amount of rainfall occurring from the inevitable and more intense, climate change-induced storms transported by our rivers and streams. Enhanced flood protection schemes must remain a central part of the solution.

Potential unintended consequences of Crown co-investment in flood protection schemes

The 'counterfactual' or unintended consequences of central government co-investment in flood protection schemes is a matter that has been considered by regional councils. Two primary risks have been identified, both of which are highly unlikely to be displayed:

1. Regional councils place too much reliance on flood protection schemes and fail to sufficiently invest in other flood risk management tools: Regional councils fully understand and are fully committed to the application of a multi-tool approach to flood risk management.⁹⁰
2. Regional councils invest less in flood protection schemes because rate payer sourced funding is substituted by tax-payer sourced funding: Regional councils have committed to spend an extra \$25m per year on flood protection schemes, over and above their current \$175m per year commitment.

Request to central government

Regional councils seek central government commitment to co-invest in the improvement of the integrity and resilience of flood protection schemes. This should be alongside the regional council-focused wide-spread and comprehensive adoption of whole-of-catchment and planning / resource management solutions⁹¹.

⁹⁰ Regional council involvement in discussions about the flood risk management at Westport provide a case example of this commitment.

⁹¹ The co-investment propositions outlined in this paper do not include provision for soil conservation planting and or steep land retirement. Budgets for these complimentary activities should be combined with flood protection scheme investments and the planning solutions outlined in this paper.

Collectively, such a joined-up approach will better achieve integrated land use, enhanced ecological values, improved water quantity and quality outcomes, decarbonisation benefits and, generally a better reflection of iwi and wider community aspirations about how natural systems should be managed.

Regional communities and directly-benefiting private property owners cannot fund the necessary step-change needed to manage increased flood risks, in the more sophisticated manner set out above, on their own. Central government, regional councils and territorial local authorities must equitably share the task of addressing this challenge. This is not about failure or blame about the efficacy of current systems. Rather, it's about the overwhelming need to cement a new co-investment and funding partnership approach with central government.⁹²

Regional council river engineers have engaged in an active 'foresight' process to estimate spending of \$350m / year is required to ensure river management and flood protection schemes are 'fit for the future'. Regional council Long-Term Plans (2018-2028) currently indicate necessary operational and capital expenditure of approximately \$200m / year. The shortfall required to make the necessary step-change in the level of protection provided by flood protection schemes is therefore estimated at \$150m / year. Central government co-investment of \$150m per annum is viewed as a pragmatic contribution to this necessary expenditure.

Source of revenue and possible funding formula

Regional councils have extended their congratulations to the government⁹³ on its decision to establish a new \$1 Billion per annum 'Climate Emergency Response Fund' (CERF). The purpose of this fund is to mitigate the effects of climate change by applying adaptation interventions.

Investment in flood protection schemes should be a priority matter for attention in considering CERF expenditure options. Flood protection schemes are the intervention measure with likely greatest effect in helping communities to adapt to the effects of climate change. Adaptation actions are required immediately, regardless of the success or otherwise of international mitigation / decarbonisation measures.

The proposed 2022 National Adaptation Plan⁹⁴ may be the instrument to guide expenditure of the CERF. Regional councils are participating in an MfE 'Local Government Adaptation Advisory Group.' One of the objectives of this participation is to ensure appropriate flood protection scheme investment provisions are considered by this Group and thereby included in the National Adaptation Plan.

Regional Councils fear the Local Government Adaptation Advisory Group deliberations will not be enough on their own to guide the necessary decisions. Councils therefore also urge establishment of a working group with Treasury, DIA, and other officials (for example officials from MBIE's Kānoa Group). Their task would be to develop the principals, priorities, and a project funding allocation framework to guide central government co-investment expenditure decisions on flood protection schemes. This group should be requested to provide its recommendations to core ministers and regional council Chairs and Mayors within three months from initiation.

Back-work to achieve this objective needs to be underway now. Without necessary co-investment decisions being made in the very near future, then the flooding risk to our

⁹² Regional authorities acknowledge that, alongside a government decision to co-invest in river management and flood protection schemes, there is a need to establish related funding-accountability measures.

⁹³ Correspondence to Ministers 23 December 2021

⁹⁴ This Plan is currently being developed by MfE.

communities will continue to incrementally increase. The consequences of not acting do not bear thinking about.

The actual co-investment share of the CERF at any single location should reflect a range of considerations.⁹⁵ The principles outlined in the July 2020 Cabinet paper provide a starter for considering how apportionment of this increased investment may be guided. From a regional council perspective, proposed central government co-investment starter thoughts were outlined earlier in this report. In essence, what is sought is:

- Co-investment of up to 75% toward the cost of **whole catchment climate change adaptation** approaches.
- Co-investment of up to 50% toward the cost of **upgrading existing** river management and flood protection works.
- Co-investment of 33% toward the **maintenance** of existing scheme works to recognise the role they play in protecting Crown assets / related infrastructure and their role in sustaining the operation of national and regional economies and communities.
- Co-investment of 75% for **emergency repair** works to schemes where substantial damage occurs from major storm events.

Although variable, indications are that for any year, approximately half of the total annual spend would comprise works in the maintenance category, with the balance being split approximately evenly between the first two categories of expenditure.

The above cost-share formula is believed to be realistically and fairly determined. It needs to be applied urgently. It clearly recognises the need for a step-change in investment to improve the 'design capacity' of existing flood protection schemes. It will result in much needed improvements to community resilience against the effects of climate change.

⁹⁵ A precedent for this is the financial assistance rate (FAR) applied to central / local co-investment in road transport solutions.

Conclusion - national leadership and urgent action required

The Government has an important and urgent role to play in leading, resourcing and focusing purposeful, timely and meaningful actions that result in practical improvements to flood protection schemes. These improvements are fundamental to the task of greatly increasing community resilience against flooding.

Regional councils have successfully delivered flood protection to New Zealanders for more than half a century. They cannot continue to be expected to do this on their own. There is a strong case for central government co-investing in flood protection schemes. The Crown owns flood-protected assets and shares in the benefits provided by these schemes. The Crown currently make close to zero funding contribution to their maintenance and improvement.

The central governments of the United States and the United Kingdom have both recently committed to substantial increased expenditure on flood protection schemes. They have seen the writing on the wall. The government of New Zealand should join them by taking similar action.

The essential request to New Zealand's central government is for it to 'return to the table' to share financially in the task of providing fit-for-purpose protection against New Zealand's primary natural hazard – 'flooding.' Flood protection schemes are the first line of defence.

Now is the time when schemes need to be re-purposed, modified, upgraded, or renewed to meet increased climate change-induced flood frequency and magnitude changes, alongside other contemporary challenges. These other challenges include meeting a wider spectrum of community, environmental, cultural, iwi / Māori and economic needs.

In some cases, planning solutions and raised building-floor heights will meet these needs. However, in most cases these initiatives will be expensive and will take a long time to be effective. Flood protection schemes need to be improved immediately to enable them to help New Zealanders to go about their businesses and carry out their lives without the fear and disruption caused by floods.

The central government co-investment of \$150m per annum from the CERF – as proposed in this report, reflects the national interest in protecting public safety, providing community resilience, mitigating risks to the national economy, and protecting nationally-significant publicly-owned infrastructure.

Flood risks are real, they are trending upwards and the effects of flooding on the communities who live and work on flood plains are significant and growing. A committed central government / regional council response is required so that necessary changes can be implemented in an orderly, timely, community-focused, and adaptive manner.

To achieve this objective, regional councils urge central government to work with them to reach agreement about the location-specific, principled, prioritised, short, and long-term combined flood protection scheme investments that can be made to address increasing flood risks.

The sought-after urgent action is central government agreeing to co-invest in flood protection schemes. The subsequent next step is to form a central government / region council group to reach speedy agreement about the quantum, timing, principles, framework, criteria, and priority projects for central government co-investment into flood protection schemes.

Appendix one: Correspondence from Environment Canterbury to Hon Nanaia Mahuta



27 September 2021

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Hon Priyanca Radhakrishnan
 Minister for Community and Voluntary Sector
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Dear Ministers,

Co-investment in river management and flood protection schemes

Flooding is New Zealand's most common natural hazard estimated to cost the country \$160 million per year. The 31 May – 2 June Canterbury regionwide flood event (and the flooding that followed in Buller and Marlborough) highlights the bias of our current system toward recovery and response action, rather than coordinated investment in early risk reduction and preparedness.

A new case study based on recent flood events in the South Island is now being prepared for your review as an update to the 2018 business case *Central Government Co-investment in River Management for Flood Protection* to further support the recommendation for permanent central government investment. We expect this to be completed by November 2021.

The Canterbury flood event was extreme, with Ashburton particularly hard hit. Concerns about structural stability temporarily closed the Ashburton River bridge on State Highway One, cutting off lifeline services reminiscent of the Rangitata floods of December 2019.

The limits of Canterbury's flood protection schemes were tested and flooding in rural areas left many landowners to deal with significant erosion and gravel deposition.

This event alone will take us at least two years to reinstate schemes to pre-flood levels of protection at an estimated cost of \$15 to \$20 million just for infrastructure replacement on a like-for-like basis.

Current funding inadequate for the challenges of climate change

Furthermore, the recent flooding is a stark reminder of our changing climate, placing flood resilience front and centre for a concerned public. The community experienced significant flow-on effects and many areas remain vulnerable to future rainfall events with landowners on high alert. We will be working alongside key stakeholders with affected communities whose lives and livelihoods have been significantly affected for some time, even as we continue to manage the impacts of the 2019 Rangitata flood.

Together with other regional councils in the River Managers Special Interest Group, we acknowledge that meeting future flood resilience objectives is beyond the reasonable capacity of ratepayers alone, particularly when flood risks are magnified by climate change. Communities are struggling to pay for the maintenance of current infrastructure, let alone additional works required to meet the challenges of more frequent and higher magnitude weather events.

Ratepayers currently bear a disproportionate share of scheme costs when compared to who benefits. We have also noted considerable post-flood community concern regarding how current schemes are funded and how works out of scheme are not.

Increasing complexity of river management

River management has evolved significantly in recent years. Multiple values prioritised at the national level must also now be supported as part of river management and flood resilience.

We work alongside iwi as tangata whenua and Treaty partners, acknowledging the special status of our relationship to ensure that Māori values and interests are protected and enhanced.

The emphasis by government, Māori, and the public on the importance of ecological, environmental, and whole of catchment considerations has resulted in an increasingly complex environment requiring community engagement, co-design of solutions with iwi, consideration of ecological and environmental issues and development of strategies for adaptive responses that must in turn be coordinated with other agency partners.

Successful co-investment for future resilience

Crown co-investment with regional communities and directly benefiting property owners in river management and flood protection is required on an urgent basis.

We are confident that our \$24.2 million climate resilience programme of flood protection projects, part-funded by the Ministry of Business Innovation and Employment's *Kānoa – Regional Economic Development & Investment Unit (REDIU)*, will prove the case for ongoing central government co-investment. These ambitious projects are currently supporting transformative initiatives that improve the resilience of our communities and support multiple values.

To consider the details of crown co-investment in flood protection, we reference the recent Local Government New Zealand (LGNZ) Regional Sector meeting with Ministers Mahuta and Shaw on climate resilience. Council fully supports the LGNZ request to establish, as a priority, a joint working group of officers who would report to Resilience Ministers in time for appropriate provisions to be included in the 2022 budget.

Investment at this critical time will pay dividends in the future to secure the intergenerational health and wellbeing of all New Zealanders and ensure that we have a resilient economic network ready to adapt to the changes we know are coming. We look forward to your response.

A handwritten signature in cursive script that reads "Jenny Hughey".

Yours sincerely
Jenny Hughey
Council Chairperson

This report has been compiled by John Hutchings
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Contributions to the report have been made by:

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**Te Uru
Kahika**

Regional and
Unitary Councils
Aotearoa

