



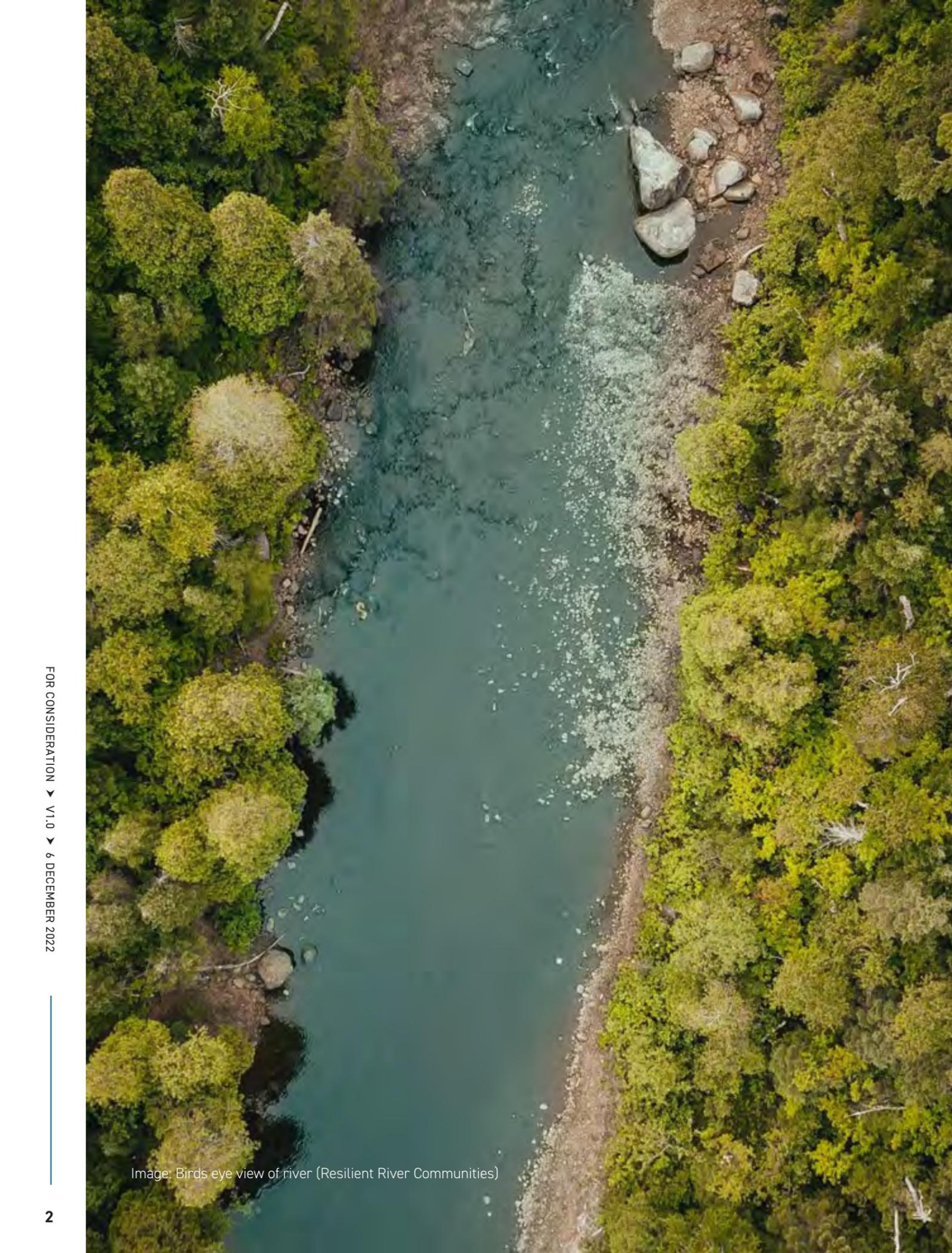
**Te Uru  
Kahika**

Regional and  
Unitary Councils  
Aotearoa

# Before the deluge

## Building flood resilience in Aotearoa

The proposal for co-investment in river  
management and flood protection

An aerial photograph of a river winding through a dense, green forest. The river is dark and reflects the surrounding trees. The banks are rocky and covered in vegetation. The overall scene is a natural, undisturbed landscape.

# Resilient River Communities

The MBIE/Kānoa/Regional and United Council 'Climate Resilience Flood Protection Programme' is developing the way forward for central government co-investment in flood resilience.

The 16 regional and unitary councils across Aotearoa are tasked with the integrated management of land, air, and water resources; supporting biodiversity and biosecurity; provision of transport services regionally; and building community resilience against climate change and natural hazards such as floods.

Collectively the regional sector's efforts are represented - through council Chief Executives - under the newly established identity Te Uru Kahika. Te Uru Kahika draws on expertise and local knowledge to promote the wellbeing of our environments and our communities.

In recent years, Te Uru Kahika has boosted its capacity to prepare for and respond to the impacts of climate change and natural hazards. The increase in flooding expected due to climate change has been a particular focus of this collective, as well as for the councils themselves.

River management and flood protection schemes, managed by the regional sector, have a critical role in mitigating against the full consequences of damaging flood events, the most frequent natural hazard experienced in New Zealand. This has been led by the River Managers' Special Interest Group (SIG), comprised of regional and unitary councils working collaboratively to increase community flood resilience.

However, climate change is expected to lead to more frequent and intense floods, and adapting to these increasing risks in the face of climate change comes with costs that can no longer be shouldered at a regional level alone.

In 2021, Resilient River Communities was launched as a joint initiative between Kānoa (the

regional Economic Development and Investment Unit), regional and unitary councils. The Kānoa Climate Resilience Flood Protection Programme initiative was aimed at developing and upgrading crucial river management and flood protection schemes via a co-investment partnership approach with central government.

Through this initiative \$312 million worth of flood resilience projects are being delivered across Aotearoa, with a \$217 million co-investment from Kānoa. In addition to the flood resilience benefits, these schemes have also enabled social procurement outcomes including the creation of jobs, new businesses, and opportunities for local communities.

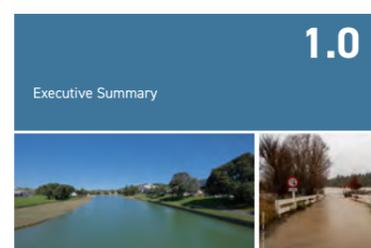
Alongside this, in recent years Te Uru Kahika, through the River Managers' SIG, has led a wider programme of work establishing the need and urgency for longer-term central government co-investment in flood protection and management. This included work lead by Tonkin+Taylor in 2018 and a substantive sector report published in 2020.

Thus far, these efforts have facilitated dialogue with key Ministers and officials, including the release of a 2020 Cabinet paper which set out a proposed framework for central government to take on a more active stewardship role in improving community resilience to flood risk. However, a co-investment commitment has not been secured to date.

Given the upcoming resource management reforms, alongside the growing risk of flood risk, it is timely to revisit the matter of co-investment that will provide pathways to long-term solutions for Aotearoa.

Image: Birds eye view of river (Resilient River Communities)

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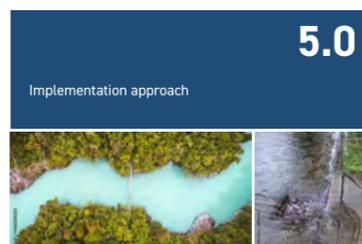
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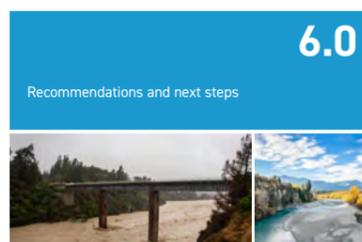
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## How to read this document

The structure of this document largely follows the Treasury-endorsed Better Business Case methodology, and is divided into five sections:

- The **strategic case** sets out the challenges we are facing and the rationale for investment
- The **economic case** assesses the options for intervention and defines the preferred way forward
- The **financial case** identifies the funding sources and provides the financial tables
- The **implementation approach** defines the role of Te Uru Kahika in the investment and identifies the subsequent areas of work
- **Recommendations** summarises the document and provides a roadmap of the way forward
- The **appendix** provides more detailed supporting information about the projects and case studies.

## Printing this document

This document contains a number of complex infographics and tables. While it should largely be legible if printed at A4, it will be even more legible if printed at the intended size of A3.



Image: Hutt River

# At a glance

## An overview of the challenge and the necessary response.



### **A significant investment is required.**

Te Uru Kahika is seeking co-investment of \$257.2m from central government alongside \$171m from regional councils to accelerate delivery of 92 urgent shovel-ready projects.



### **Continuation of existing Covid recovery funding allows:**

- The momentum developed over the last few years to be maintained
- More vulnerable communities to be protected
- Minimising and/or avoiding the fiscal impacts of more frequent and severe floods.



### **The case for taking immediate action is irrefutable.**

Both national and international studies show the return on investment from well-designed flood protection works is considerable: \$1 spent protecting a community avoids \$5-\$8 in clean-up costs afterwards, before the intangible benefits - in health, social, cultural, and environmental impacts - are considered.

The climate is rapidly changing. The frequency and magnitude of floods is accelerating.



### **There is a distinct national interest and national assets to be protected.**

Co-investment from central government acknowledges shared accountabilities.



### **Regional councils have demonstrated their capacity and capability to deliver flood protection infrastructure.**

This remains the first line of defence against flood risks, and a primary means of building community resilience until other longer term measures are put into effect.

# The role of this investment case

## How this investment proposal relates to other initiatives.

Considerable work has been done over the last few years to assess and quantify the risks and investment approaches needed to address them, as the diagram below shows. The work we are planning – discussed in more detail on the following pages – builds on the analysis and co-investment pathways developed between central government and Te Uru Kahika over the last few years, with the intention of providing Aotearoa with a pragmatic roadmap for flood resilience over the coming decades.

### Hidden in plain sight | 2018

Tonkin + Taylor report documenting extent and value of flood protection schemes in Aotearoa

### Co-investment proposal | 2019

Proposed approach from regional councils to co-funding essential infrastructure

### NZIER report | 2020

Economic assessment of the likely costs and benefits of flood mitigation showing premium return from investment in flood risk mitigation, compared to that of other natural hazards

### COVID recovery funding | 2020

\$217m capital injection for essential works as part of the COVID recovery programme

### Westport business case | June 2022

The business case to co-invest in flood protection measures in response to the catastrophic Westport floods of July 2021

### Co-investment supplementary report | January 2022

Updated proposal from Te Uru Kahika for co-investment in flood protection schemes, demonstrating (through three case studies) the value of Crown assets being protected by schemes

### Co-investment proposal | December 2022

The proposal for co-investment of \$257.2 million in 92 urgent flood protection projects over the next three years

### Sustainable co-investment model | July 2023

Development of the long-term approach to sustainable co-investment in flood protection under the PARA framework commences

### Delivery projects | July 2023

Commencement of the majority of the 92 flood protection projects across Aotearoa

# 1.0

## Executive Summary



# The current state of flood protection

## Flood protection is crucial to the economic, social, cultural, and environmental wellbeing of Aotearoa.

Flooding is the most common natural hazard in Aotearoa, with a major flood event occurring on average every eight months. Across the country around 675,000 people – or 14 percent of the population – live in areas prone to flooding.

Floods impose an annual cost to the nation of over \$160 million in direct economic damage and clean-up costs, and a much higher toll in wider economic, social, cultural, and environmental impacts. It is also one of the most avoidable hazards and can largely be mitigated through flood protection schemes that reduce the risk of flooding.

Flood protection can be understood as a network asset that may include stopbanks, floodgates, pump stations, diversions, and river management works; all of which work together to protect areas where people live, work, and play.

There are currently 367 flood protection schemes in place, representing a combined capital value of \$2.3 billion, with \$200 million in annual operational expenses to maintain current levels of service. Together, these schemes directly protect around 1.5 million hectares of land and capital across the country, including the most highly populated regions in the country and many areas of significant cultural and social value, such as marae and urupā.

The map at right provides a snapshot of key flood-related metrics, including the estimated benefit value (in \$billions) of these schemes for each region across the country. Consequently, these tend to be areas with the highest levels of

economic activity and are therefore central to New Zealand's economy.

In this way, flood protection schemes comprise a core economic enabling infrastructure and are crucial to the economic, social, cultural, and environmental wellbeing of Aotearoa.

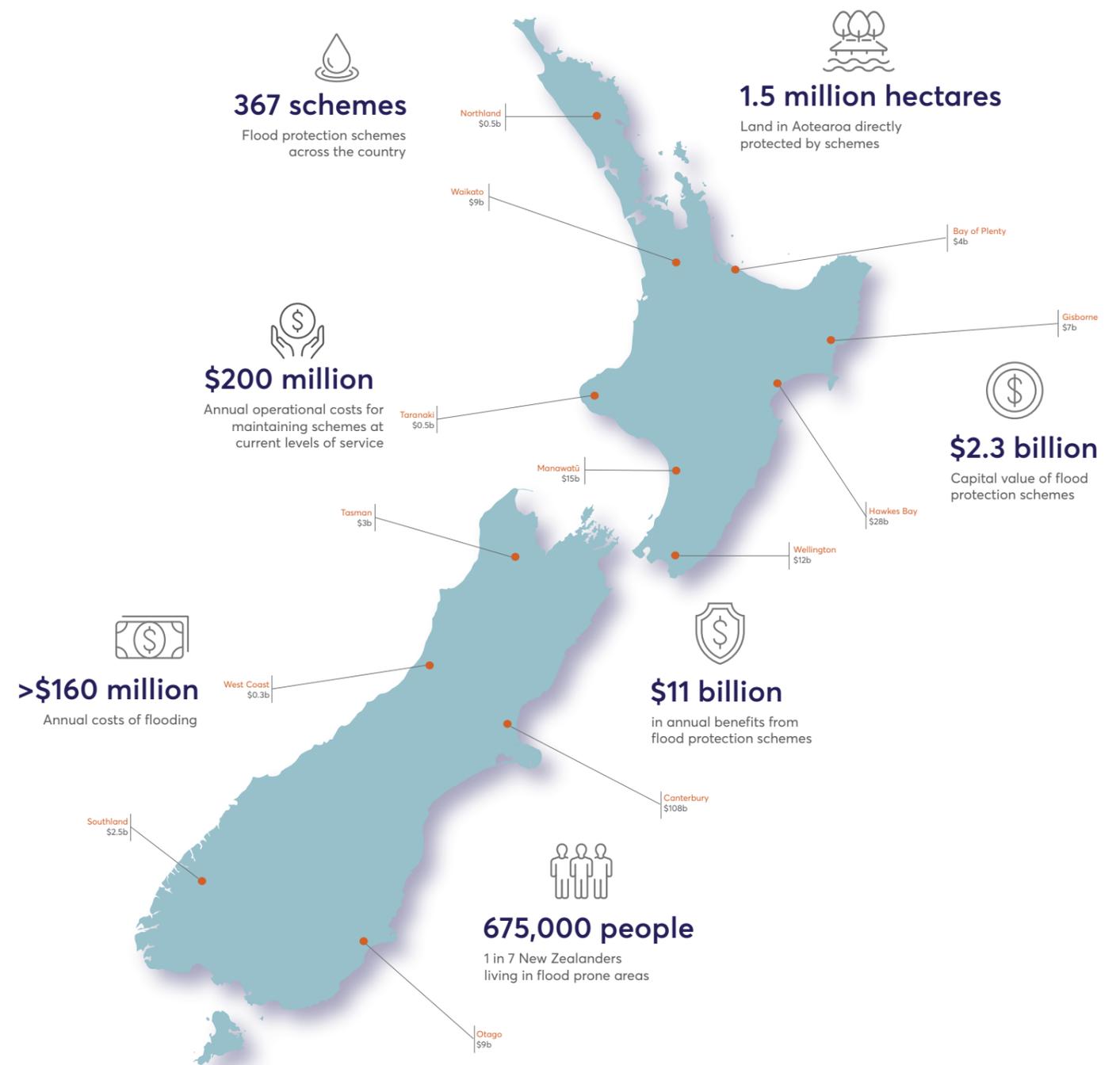
Schemes are largely funded through targeted rates and operated and managed by local and regional councils. Yet, they also provide wider benefits in protecting Crown assets on non-rateable land, and critical national infrastructure such as three waters, transport networks, and energy and telecommunication links.

Indeed, the total value of these benefits to the nation have been estimated at \$11 billion each year. This is a benefit-to-cost ratio of around 5:1.

Despite the billions of dollars in benefits, flood management and protection has been largely absent from conversations with central government over the last three decades

This current funding model is neither sustainable nor fit-for-purpose in the face of growing challenges around climate change and the ability of local ratepayers to fund the necessary level of investment.

Source: Tonkin & Taylor (2018). Hiding in plain sight: An overview of current practices, national benefits and future challenges of our flood protection, river control and land drainage schemes. Report for River Managers' SIG.



# The evolving scale of the challenge

## Climate change impacts and our current funding approach are exacerbating our risks.

Flooding poses very significant risks to lives, livelihoods, communities and the economy, as we continue to see with every major flooding event. However, there are three main indicators that the situation is about to become worse.

First and foremost, existing flood protection schemes require ongoing maintenance and repair to maintain the levels of service and/or renew the asset for upcoming decades. Many schemes need major upgrades in order to continue functioning as intended. This does not include the implementation of new schemes and initiatives to meet current and future needs.

However, flood protection schemes are primarily funded through a ratepayer base, and increasing rates to fund this necessary work is neither viable nor equitable. In the absence of any central government funding, the affordability and continuity of flood protection schemes – so crucial to protecting our nation’s assets – remains under threat.

Second, the assets protected by these schemes have steadily increased in value over time. Adjacent urban development has also intensified. This means that the damage from a major flood event will incur significant wellbeing and economic costs, which are rising over time. Traditionally some of these costs have been recouped via insurance, although pay-outs do not cover the full extent of damage nor do they reduce the future risk of flooding.

Third, and relatedly, the impacts of climate change are creating further risks to our flood resilience. Both NIWA and international evidence indicates an increased frequency and severity of extreme flood events, alongside rising sea levels which pose threats to coastal communities.

Increasing flood events lead to successive increases in insurance premiums as well as the partial or full

withdrawal of cover by insurance companies, as already seen in parts of the United States.

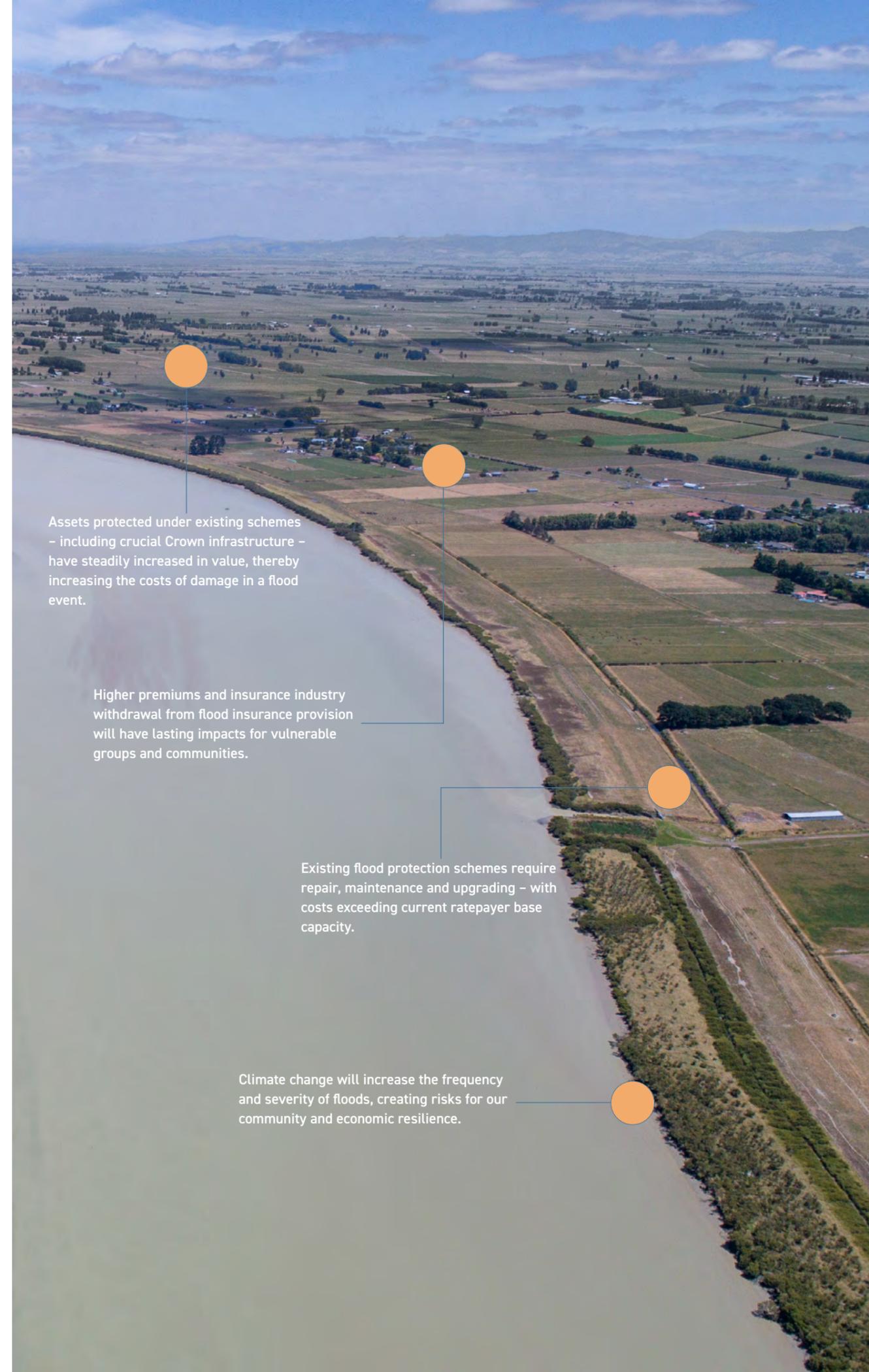
Indeed, recent research has conservatively estimated that New Zealand will see very significant insurance premium hikes within the next ten years, with more than 10,000 houses across Wellington, Auckland, Christchurch, and Dunedin experiencing full insurance withdrawal by 2050. While the Insurance Council of New Zealand has previously signalled their own commitment toward maintaining insurance support for high risk communities, this is contingent on broader national-level commitments toward flood risk mitigation.

Higher insurance premiums and retreat will create lasting impacts for vulnerable communities who will be unable to rebuild nor have the means to relocate after a flood. This is just one way climate change will disproportionately be felt those most vulnerable in society, with enduring impacts on intergenerational wellbeing.

Flooding also represents a significant liability for the government through disaster response and funding via agencies such as NEMA. The projected costs of climate change on storms and flood liability alone is conservatively estimated to increase Crown liability to between \$231 and \$261 million per year by 2050.

Together, these lines of evidence suggest materially increased risks to Aotearoa’s wellbeing and economy in coming years. Mitigating these foreseeable risks through central government co-investment will serve as the nation’s first line of defence against climate change-induced flooding, with benefits for every New Zealander.

Sources: NZIER (2020). *Investment in natural hazards mitigation: Forecasts and findings about mitigation investment*. Report to DIA; Storey, B., Owen, S., Noy, I. & Zammit, C. (2020). *Insurance Retreat: Sea level rise and the withdrawal of residential insurance in Aotearoa New Zealand*. Report for the Deep South National Science Challenge, December 2020.



Assets protected under existing schemes – including crucial Crown infrastructure – have steadily increased in value, thereby increasing the costs of damage in a flood event.

Higher premiums and insurance industry withdrawal from flood insurance provision will have lasting impacts for vulnerable groups and communities.

Existing flood protection schemes require repair, maintenance and upgrading – with costs exceeding current ratepayer base capacity.

Climate change will increase the frequency and severity of floods, creating risks for our community and economic resilience.

# Impact on communities: The case of Westport

## There are significant and long-term impacts on our communities and economies from flooding events.

Flooding creates detrimental economic, social, cultural, and environmental impacts for communities, as illustrated by the recent Westport floods.

### Floods create significant financial costs in damage, recovery and response, and wider economic damage

The July 2021 floods alone saw more than 2,000 people evacuated from over 826 properties. Nearly a quarter of the town's housing stock was damaged or deemed unsafe for occupation, representing around \$88 million in insurance claims settled to date.

Unfortunately, while the town was still recovering, in February 2022 another major flood led to further evacuations, damage to homes and infrastructure, access to the town being cut off, and a State of Local Emergency being declared.

Initial damage assessments carried out in late February estimated between \$21.5 and \$43 million in damages from the two flooding events. This includes costs in damage to crucial infrastructure such as roading and water supply, removal of domestic waste, and damage to at least 70 farms district wide.

More than a year on from the July floods, less than one fifth of homes have been fully repaired and the costs of recovery have been estimated at nearly \$100 million. Unfortunately, these damage and recovery costs will fall to the community in a region with high levels of socioeconomic deprivation.

Beyond the immediate costs incurred from flood damage, there is also the sizeable cost associated with Government responses to flooding events, such as deploying the New Zealand Defence Force, emergency services, and other relief agencies. While these have not been quantified for the Westport case, data from 1976 to 2004 indicates government expenditure on civil defence responses for floods alone averaged about \$15 million per year.

There are also broader economic costs associated with social and business disruption, such as accommodating displaced residents, losses in income and production from businesses being unable to operate, disruption to schooling, and damage to natural and cultural heritage. Ultimately these costs are subsequently borne by the entire nation through higher insurance premiums as well as tax increases to fund repairs and future flood response.

### Floods also create significant social and environmental impacts on wellbeing

The impacts of flooding on families and communities can extend well beyond the 'recovery and rebuild' stage. Aside from potential injuries and loss of life, there is also the enduring psychological and emotional toll on affected communities.

A recent news article following Westport residents a year on from the July floods shows just how much of a daily stressor it can be, and how long it can take for a community to recover from a major flood event. Long term, these can affect people's tolerance of flood risk and their willingness to live in certain areas.

Flooding and other natural disasters can also exacerbate inequities, especially when there is a reliance on insurance-based transfer of risk, as is the case in New Zealand. This is because low-income and disadvantaged households disproportionately live in low-cost housing/rentals less resilient to floods and in high-risk areas, and may be unable to afford appropriate levels of insurance.

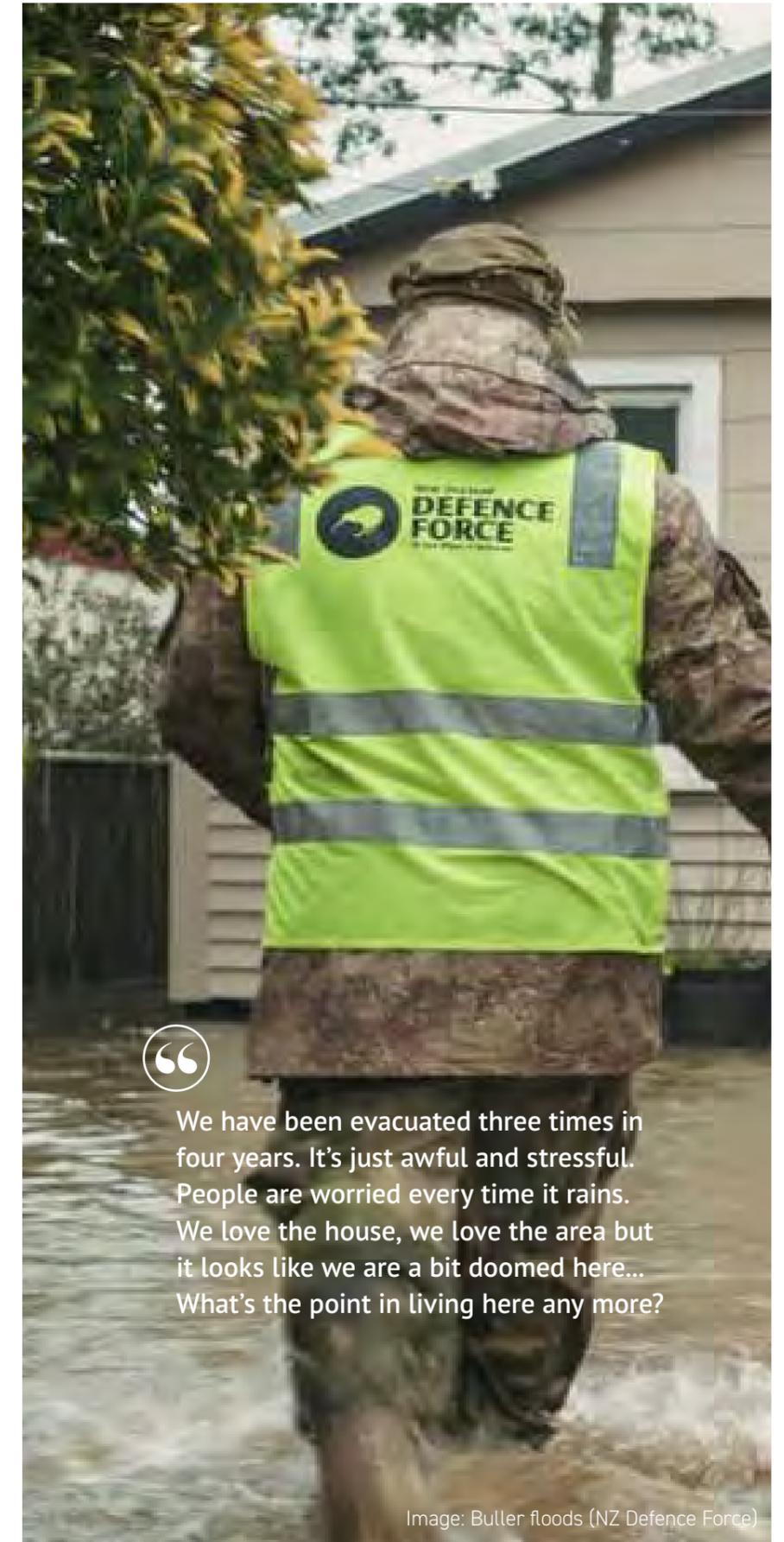
Thus, many of these families are unable to rebuild post-disaster and struggle to recover. They may also lack the means and support networks to relocate, resulting in higher debt or even homelessness. The compounding effect of these challenges creates a poverty trap with lasting intergenerational impacts.

Such impacts may be further amplified for vulnerable groups in Aotearoa – including Māori, recent migrants and ethnic minorities, the elderly, and people with disabilities. A recent DIA report identifies at least 75 communities across Aotearoa with high levels of socioeconomic vulnerability and exposure to risk of flood, with 44 of these being particularly 'vulnerable' in terms of not having flood protection infrastructure nor financial capacity to fund flood responses.

Finally, there are also environmental impacts of flooding. For example, as a result of the July 2021 floods in Westport more than 2,100 tonnes of flood-affected building and domestic waste was sent to landfills. This creates a further unquantified financial and environmental cost.

In this way, the economic, environmental, social, and intergenerational wellbeing impacts of flooding are felt long after the floods recede. More often than not, these impacts of climate change-induced weather events are disproportionately borne by low-income and vulnerable groups. Importantly, it is not just these natural disasters, but also how governments mitigate and respond to them, that contributes to growing inequality.

Sources: Stuff.co.nz. (15 July 2022). *More than 400 homes still not repaired one year on from Westport floods*. Retrieved from <https://www.stuff.co.nz/the-press/news/west-coast/300636197/more-than-400-homes-still-not-repaired-one-year-on-from-westport-floods>; DIA. (2020). *Vulnerable communities exposed to flood hazard* report.



We have been evacuated three times in four years. It's just awful and stressful. People are worried every time it rains. We love the house, we love the area but it looks like we are a bit doomed here... What's the point in living here any more?

Image: Buller floods (NZ Defence Force)

# There are strategic risks in our current approach

## The business as usual approach to flood protection is creating significant strategic risk for the Crown.

**Climate change will increase our flood risk of flood events, and if left unmitigated this will lead to partial or full insurance retreat.**

### Climate change increases flood risk and insurance retreat

Climate change has been identified as a threat to the re/insurance industry as early as 1979. The issue impacts insurance markets in two ways.

First, extreme weather events are increasing our underlying flood risk meaning insurance companies are also increasingly taking on a greater risk, along with potentially bigger financial losses. This requires a greater reliance on reinsurance to remain solvent.

Second, it means that flooding is no longer an unforeseeable or chance event, but is becoming an increasing reality for many regions. Indeed, the Insurance Council of New Zealand (ICNZ) notes that certain impacts of climate change such as sea level rise are neither unforeseen nor insurable.

As a result, insurers are more attuned to climate change in their actuarial analysis and pricing. Using sophisticated catastrophe and disaster modelling tools, insurers are now shifting toward risk-based pricing where individual flood risk ratings determine premiums.

In some cases, the level of flood risk may be too high or unprofitable for re/insurers to underwrite, making insurance unaffordable and/or restricted in certain regions (partial retreat) or creating 'no go' zones where insurance companies fully retreat from providing coverage.

Previous evidence suggests partial insurance retreat occurs when flood probabilities exceed the 2% Annual Exceedance Probability (AEP) threshold, and full retreat by 5%. In fact, we are already seeing insurance retreat play out in flood-prone areas such as Florida and Louisiana, in the United States.

### The state of play in Aotearoa

According to a 2018 Lloyd's of London report, New Zealand is the second riskiest country, after Bangladesh, in terms of expected losses from natural disasters (as a proportion of GDP). We also have one of the highest levels of insurance penetration in the world - between 96 to 98% of homes being insured - with flood risk cross-subsidised over a wide base.

However, in late 2021 Tower Insurance shifted toward an individual risk based system for flood protection with approximately 10% of its customer base seeing an increase in premiums. Based on early indications we can expect the local insurance market to follow suit, especially since most insurance companies in Aotearoa are internationally based.

Other companies such as IAG have also signalled the impending impact of climate change on risk, while calling for urgent collaborative flood risk prevention and reduction.

These changes are likely to have implications for insurance availability and affordability, and central government is already considering options for home flood insurance as outlined in the National Adaptation Plan.

The ICNZ has also set out its views on the need for an urgent, proactive, and coordinated approach to flood risk mitigation and adaptation in Aotearoa. They have emphasised that the time for acting is now, while insurance is still largely accessible across the country, rather than relying on affordability issues as the trigger for action.

More recently IAG has echoed these sentiments and put forward a three-step plan for flood risk reduction, including:

- (1) improved mapping of flood prone locations;
- (2) implementing national policy to stop development in flood prone locations; and
- (3) developing a business case for a national programme of investment in flood protection based on priority locations identified in step 1.

Thus, there is growing impetus from the insurance industry for more proactive risk reduction and adaptation in the lead up to its eventual shift toward risk-based pricing, alongside consistent signalling that the industry is committed to being part of the solution.

Sources: Bajrektarevic, A., & Baumer, C. (2012). *Climate change and reinsurance: The human security issue*. Economics, Management & Financial Markets, 7(4), 42-86; Surminski, S. (2017). *Fit for the future? The reform of flood insurance in Ireland: resolving the data controversy and supporting climate change adaptation*. Policy paper, The Grantham Research Institute on Climate Change and the Environment; Storey, B., Owen, S., Noy, I. & Zammit, C. (2020). *Insurance Retreat: Sea level rise and the withdrawal of residential insurance in Aotearoa New Zealand*. Report for the Deep South National Science Challenge, December 2020; Lloyd's of London. (2018). *A world at risk: Closing the insurance gap*; Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington.; ICNZ. (2022). *ICNZ submission on the draft National Adaptation Plan including managed retreat*. Retrieved [www.icnz.org.nz](http://www.icnz.org.nz).

# The co-investment approach

## Significant national interest in flood protection requires ongoing co-investment.

### Our co-investment proposal will enable essential infrastructure work to progress in some of our most vulnerable communities.

In 2021, Kānoa invested \$217 million into 55 flood protection projects across Aotearoa as part of the government's COVID-19 recovery programme. This investment represents the most significant contribution from central government in over 30 years and has fast-tracked projects to improve long-term community flood resilience.

Regional councils prioritised 'shovel ready' projects that would accelerate existing or planned programmes of work for flood risk management. Kānoa and central government priorities for these projects were around climate resilience, with social procurement as an implementation requirement.

This programme was considered the first step in an establishing an effective ongoing co-investment partnership for flood resilience between central and local government.

The midway progress report (included in the Strategic Case section) evidences councils' capability and track record of delivery on projects funded through central government contributions. A selection of case studies are also included; demonstrating the social, economic, cultural, and environmental benefits arising from these projects.

The sector's delivery and execution of these 55 essential flood protection projects provides

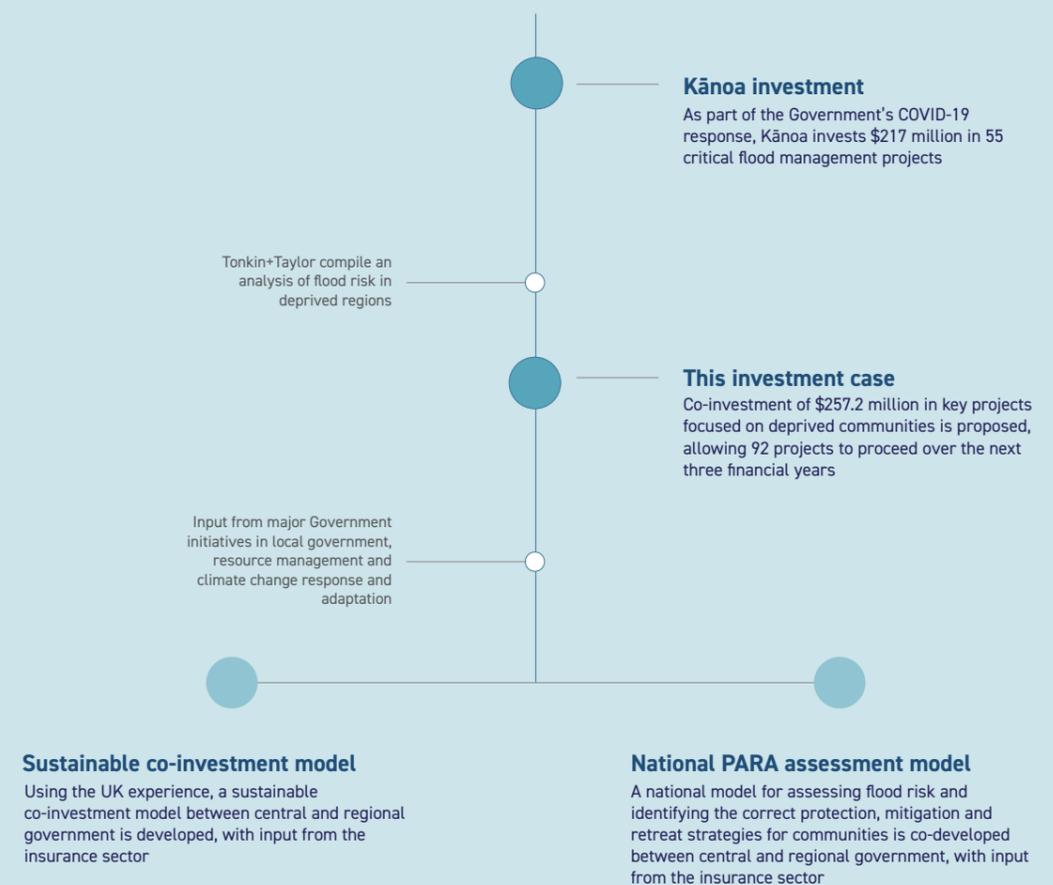
an important foundation for co-investment and developing genuine partnership with central government in improving community flood resilience and wellbeing outcomes.

Within this context, our request for co-investment of \$257.2 million over three years represents the continuation of essential infrastructure work, allowing some of our most vulnerable communities to progress shovel-ready flood protection projects.

Central government has and continues to demonstrate a significant interest in improving our flood resilience in the face of climate change; as seen in the 2020 Cabinet Paper, the National Adaptation Plan 2022-2028, and the Resource Management Act reforms. This interest is also increasingly reflected in our communities' needs and expectations.

Sources: Cabinet paper. (2020). *Improving resilience to flood risk and supporting the COVID-19 recovery*; Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington.; ICNZ. (2022). *ICNZ submission on the draft National Adaptation Plan including managed retreat*. Retrieved www.icnz.org.nz.

Two additional elements are required to ensure Aotearoa has a robust approach to flood protection that will respond effectively to the challenges of climate change. These are a sustainable co-investment model that brings together central and regional government, and a national PARA assessment model that enables informed decisions to be made about protection, mitigation and retreat on a community-by-community basis across Aotearoa. These elements are discussed later in our investment case.



# Project locations: North Island

## Profile

Total number of projects = **49**  
Total investment = **\$250.6m**

### Territorial authority by deprivation quintile

Ōpōtiki District	5321
Far North District	4801
Horowhenua District	4627
Hauraki District	4622
Gisborne District	4480
Whanganui District	4383
Whakatāne District	4322
Waitomo District	4219
Kaipara District	3998
Masterton District	3939
Waikato District	3725
Thames-Coromandel District	3593
Hastings District	3535
Palmerston North City	3519
Napier City	3390
Taupō District	3248
Upper Hutt City	3200
Kāpiti Coast District	3095
Western Bay of Plenty	2933
Carterton District	2728
South Wairarapa District	2565





# Project investment summary

A deprivation-based approach has been used to allocate national funding, using a 75/60 model.

Following the recent steer by DIA as well as the focus on deprived communities in the 2020 Cabinet Paper, we have used deprivation as both a prioritisation tool for the most vulnerable region, as well as a suggested mechanism for apportioning cost share across projects.

The methodology is based on a region - here, we refer to the Territorial Authority (TA) level - being allocated a co-investment contribution based on ability to fund the flood protection measures from the regional ratepayer base.

Thus, majority of regions are allocated a co-investment contribution of 60%, with the most deprived territorial authority - Ōpōtiki District - getting a higher rate of 75%. This higher deprivation

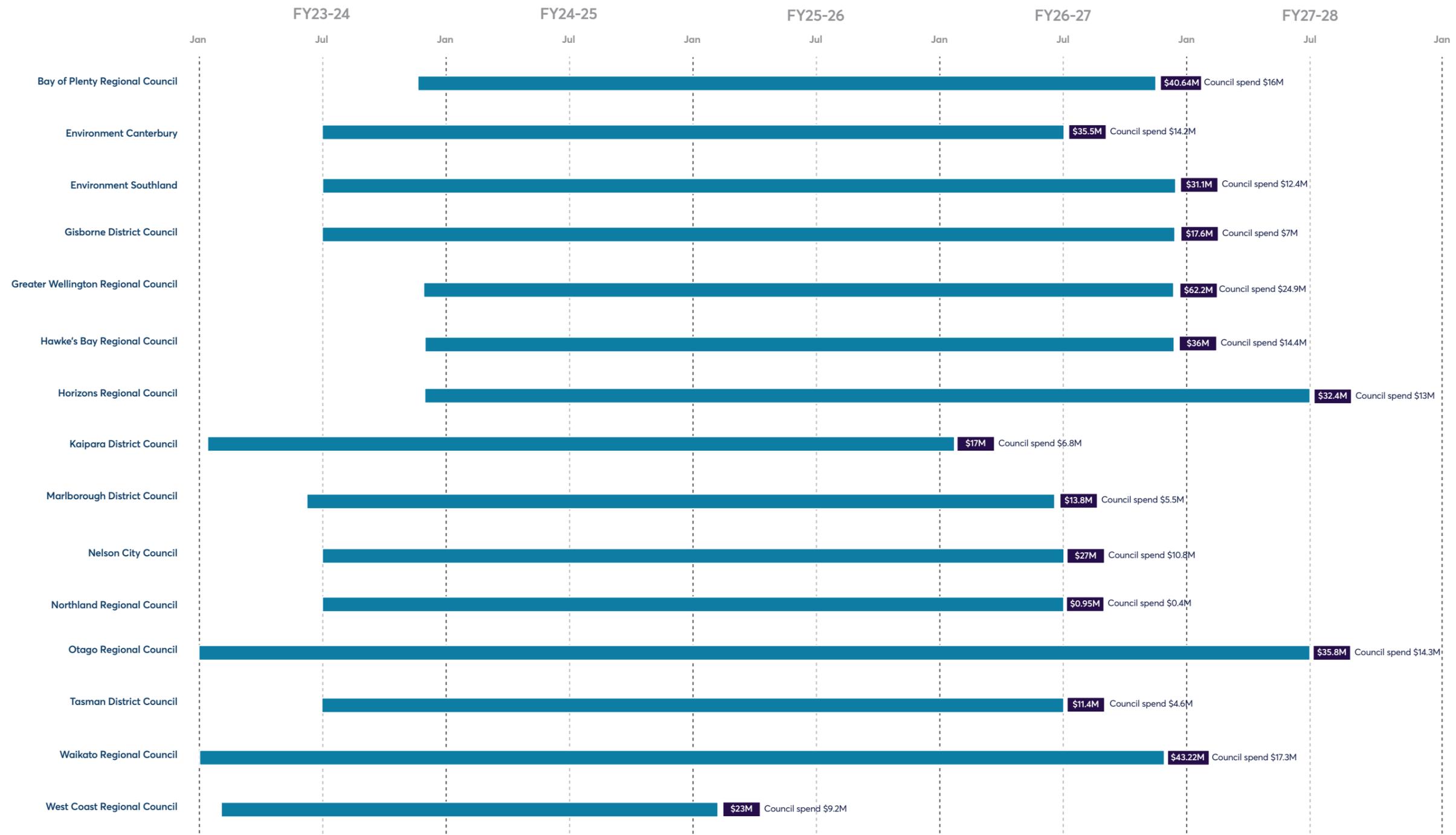
The table at right summarises the funding breakdown across projects and shows what the allocation of investment between central government and regional councils might look like with this approach.

As indicated, the central government investment is \$257.2m and the regional council investment is \$171m.

Territorial Authority (TA)	IMD (Total)	Level of assistance	Total Project Cost	Crown	Regional
Ōpōtiki District	5321	75%	\$1.84	\$1.38	\$0.46
Far North District (2)	4801	60%	\$0.91	\$0.55	\$0.36
Horowhenua District	4627	60%	\$12.70	\$7.62	\$5.08
Hauraki District (6)	4622	60%	\$16.98	\$10.19	\$6.79
Gisborne District (3)	4480	60%	\$17.60	\$10.56	\$7.04
Whanganui District	4383	60%	\$13.20	\$7.92	\$5.28
Whakatane District (2)	4322	60%	\$22.40	\$13.44	\$8.96
Waitomo District	4219	60%	\$5.00	\$3.00	\$2.00
Kaipara District (2)	3998	60%	\$17.00	\$10.20	\$6.80
Masterton District (6)	3939	60%	\$13.19	\$7.91	\$5.28
Grey District	3896	60%	\$4.00	\$2.40	\$1.60
Waikato District (6)	3725	60%	\$18.44	\$11.06	\$7.38
Thames-Coromandel District	3593	60%	\$2.80	\$1.68	\$1.12
Hastings District (2)	3535	60%	\$34.00	\$20.40	\$13.60
Palmerston North City (2)	3519	60%	\$6.50	\$3.90	\$2.60
Invercargill City	3395	60%	\$11.00	\$6.60	\$4.40
Napier City	3390	60%	\$2.00	\$1.20	\$0.80
Taupo District	3248	60%	\$3.40	\$2.04	\$1.36
Upper Hutt City (3)	3200	60%	\$19.66	\$11.80	\$7.86
Kapiti Coast District	3095	60%	\$14.70	\$8.82	\$5.88
Gore District	3044	60%	\$18.00	\$10.80	\$7.20
Westland District (3)	3032	60%	\$19.00	\$11.40	\$7.60
Western Bay of Plenty	2933	60%	\$13.00	\$7.80	\$5.20
Nelson City (6)	2911	60%	\$27.00	\$16.20	\$10.80
Christchurch City	2831	60%	\$1.50	\$0.90	\$0.60
Clutha District (3)	2813	60%	\$6.50	\$3.90	\$2.60
Dunedin City (10)	2791	60%	\$27.80	\$16.68	\$11.12
Carterton District	2728	60%	\$2.68	\$1.61	\$1.07
Timaru District (3)	2641	60%	\$7.50	\$4.50	\$3.00
South Wairarapa District (5)	2565	60%	\$12.60	\$7.56	\$5.04
Tasman District (2)	2517	60%	\$11.40	\$6.84	\$4.56
Marlborough District (4)	2449	60%	\$13.80	\$8.28	\$5.52
Ashburton District	2314	60%	\$20.00	\$12.00	\$8.00
Waimakariri District (2)	2204	60%	\$6.50	\$3.90	\$2.60
Southland District (4)	1879	60%	\$2.10	\$1.26	\$0.84
Central Otago District	1217	60%	\$1.50	\$0.90	\$0.60
<b>Total investment</b>			<b>\$428.20</b>	<b>\$257.20</b>	<b>\$171.00</b>

# The delivery roadmap

Consolidated overview of Regional Council spend



# 2.0

## Strategic case



# Understanding flood risk

We are a nation shaped by water and Aotearoa has a long history of living with flooding.

Flood risk is the product of hazard, exposure, and vulnerability.

Floods are the most commonly occurring natural hazard in Aotearoa, with a major flooding event occurring on average every eight months. Across the country around 675,000 people – or 14 percent of the population – live in areas prone to flooding.

Floods impose an annual cost to the nation of over \$160 million in direct economic damage and clean-up costs, along with wider and more enduring economic, social, environmental, and cultural impacts.

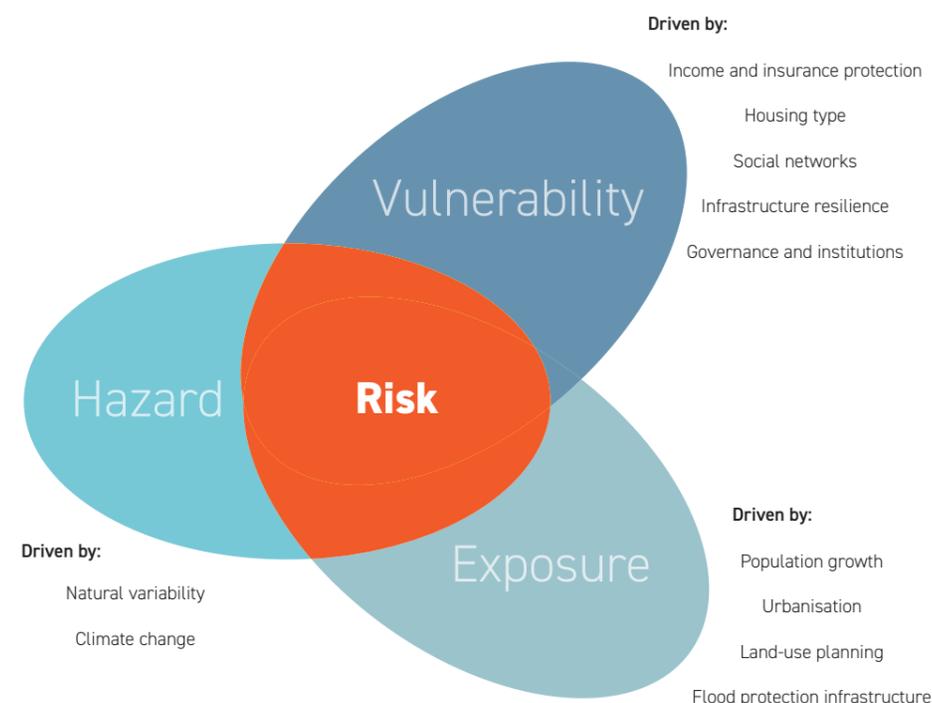
There are three main types of floods:

1. **Fluvial (riverine) floods** when intense rainfall causes rivers or lakes to overflow onto neighbouring land
2. **Pluvial floods** when extreme rainfall creates flash floods or surface water that overwhelms drainage capacity in urban areas
3. **Coastal floods** when storm surges, high tides, or tsunamis inundate land near the coast

For simplicity, we use the term 'flood' more generally throughout this document, referring to specific types where relevant.

Although the incidence of flood events is expected to increase globally due to the impacts of climate change, it also remains one of the most avoidable natural hazards and can largely be mitigated through flood protection and adaptation schemes that minimise flood risk.

The figure and sidebar at right explain flood risk in more detail.



## Understanding Flood Risk

### Hazard

Aotearoa's unique topography, geography, and history of settlement on flood plains and in coastal regions means that flooding is a common natural hazard. Climate change is expected to further increase the frequency and magnitude of flood events in the near future.

### Exposure

Parts of the population, ecosystems, and key infrastructure may be more or less exposed to floods due to their location as well as the presence and effectiveness of flood protection infrastructure. In response to population growth, policy decisions impacting urbanisation, planning, intensification, and implementation of flood protection infrastructure can result in differential exposure to flooding.

Around the country, communities may also be exposed to multiple hazards beyond just floods.

### Vulnerability

Flooding can have devastating impacts on our economic, social, cultural, and environmental wellbeing. These impacts may be greater for certain groups and communities due to factors such as income, housing type, age, and social networks. Therefore, vulnerability varies across different groups, affecting how these groups can respond to and recover from flooding events.

### Flood Risk

Flood risk is therefore the product of dynamic interactions between hazards, exposure, and vulnerability, as illustrated in the figure.

In Aotearoa, flood risk is increasing due to climate change and increased population growth and assets in flood-prone regions. However, as noted in a recent global report on flooding: "the problem is compounded by policy failures, underinvestment in flood protection, and poor planning decisions."

Source: Carpenter, M., Wyman, O., & Marsh, G. (2021). *Sunk costs: The socioeconomic impacts of flooding*. Retrieved from Marsh McLennan

# How flood protection has developed

Responsibility for flood protection has evolved over the decades.

## Reforms in the late 1980s resulted in flood protection responsibilities transferred to regional councils, including a transition to exclusively local funding.

New Zealand's approach to river management and flood protection has undergone major transformations over the last century. Prior to the 1940s, there was a piecemeal approach to river management and land drainage activities which led to soil erosion issues impacting waterways.

The introduction of the Soil Conservation and Rivers Control Act 1941 saw New Zealand become a world leader in its recognition that land and water management practices for flood protection needed to be catchment based. Consequently, catchment boards were established to regulate and manage river functions, as well as design and implement the necessary flood protection infrastructure still in place today.

Catchment boards worked collaboratively with local communities and central government to implement schemes that provided safety and security for communities, as well as providing for the economic wellbeing of both rural and urban communities.

Central government contributed between 50-75% of capital expenditure and 33% of ongoing maintenance costs, equating to a \$40 million per (the equivalent of \$114 million in present day terms) annually.

This funding acknowledged that Crown assets were directly benefiting from these schemes,

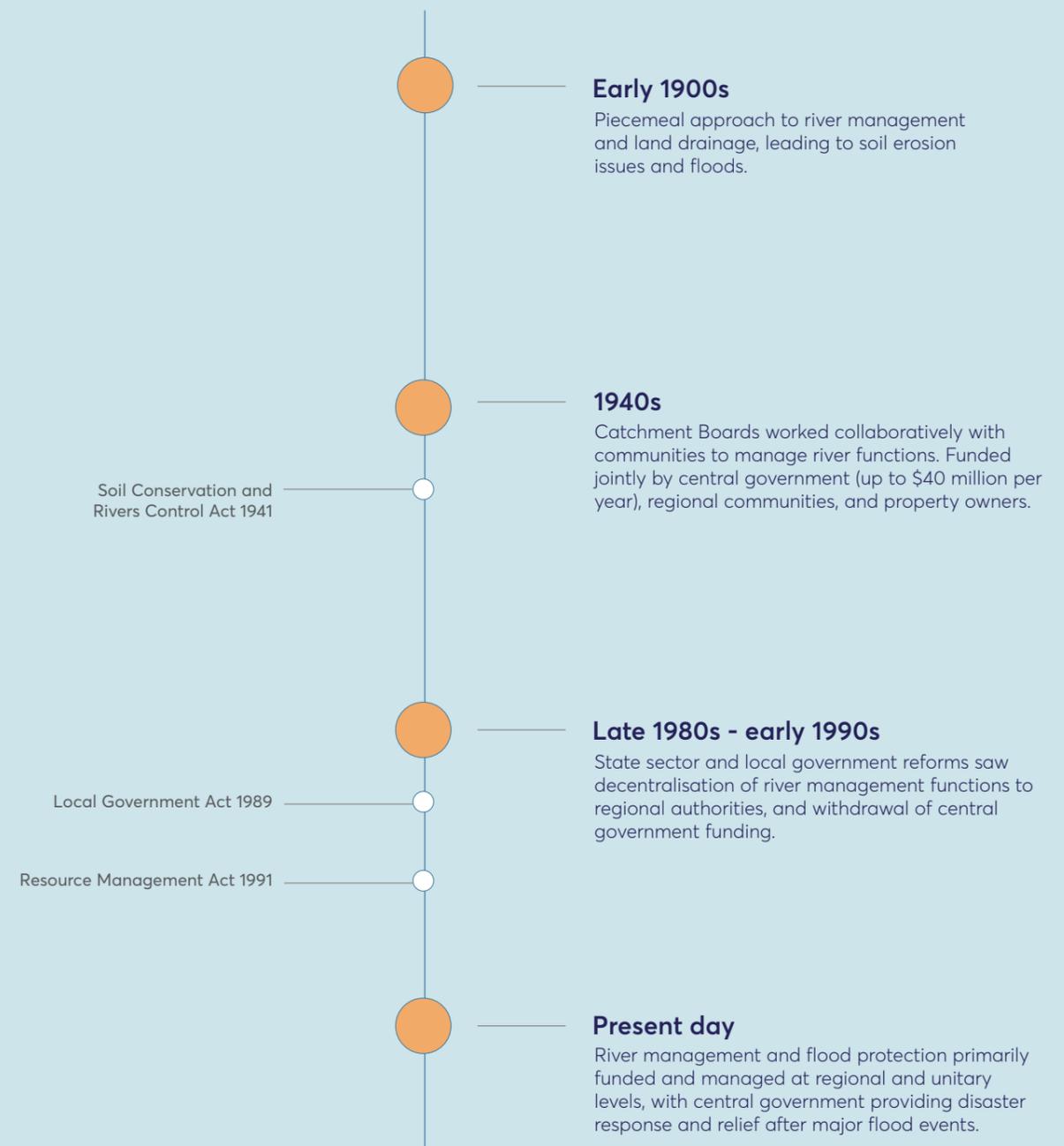
while also recognising the wider national interests and government's responsibilities in being a joint investor. On the other hand, local contributions fostered a sense of ownership among communities that benefited.

However, as a result of the major state sector and local government reforms of the 1980s - including the Local Government Act 1989 and the Resource Management Act 1991 - river management and related soil conservation functions were transferred to regional authorities, eliminating central government funding simultaneously.

Since 1989, regional and unitary councils have been responsible for the construction, maintenance, and upgrades of river control, flood protection, and land drainage schemes. This work is funded almost entirely through regional rates and targeted levies on property owners.

Instead, for the last three decades central government's role in flood management has focused more so on disaster response and relief, rather than in preventing damage.

This contrasts with most international approaches to flood resilience - including in Europe, the United Kingdom, Australia, and the United States - where significant levels of central funding support flood protection and mitigation activities.



# The current state of flood protection

There are 367 flood protection schemes protecting 1.5 million hectares of land across Aotearoa.

Current flood protection schemes offer a five-fold benefit, making them crucial to the wellbeing of Aotearoa.

With the decentralisation of flood management, flood protection schemes have been funded by ratepayers through targeted and/or general rates. There is variation in how this is managed, with some councils enabling communities to self-select into flood mitigation schemes, while others provide flood protection infrastructure more broadly across the region.

The map at right provides a snapshot of key flood-related metrics, including the estimated benefit value (in \$billions) of these schemes for each region across the country.

Currently 367 flood protection schemes directly protect over 1.5 million hectares of land and capital across 100 towns and cities. These tend to be densely populated with the highest levels of economic activity and therefore central to the New Zealand economy, as well as areas of significant cultural and social value, such as marae and urupā.

In addition, they also provide wider benefits in protecting Crown assets on non-rateable land and critical national infrastructure such as three waters, transport networks, and energy and telecommunication links.

In this way, flood protection schemes comprise a core economic and social enabling infrastructure: providing a secure place for stable economic

activity and for people to thrive and build cohesive communities. For these reasons, flood protection schemes remain crucial to the economic, social, cultural, and environmental wellbeing of Aotearoa.

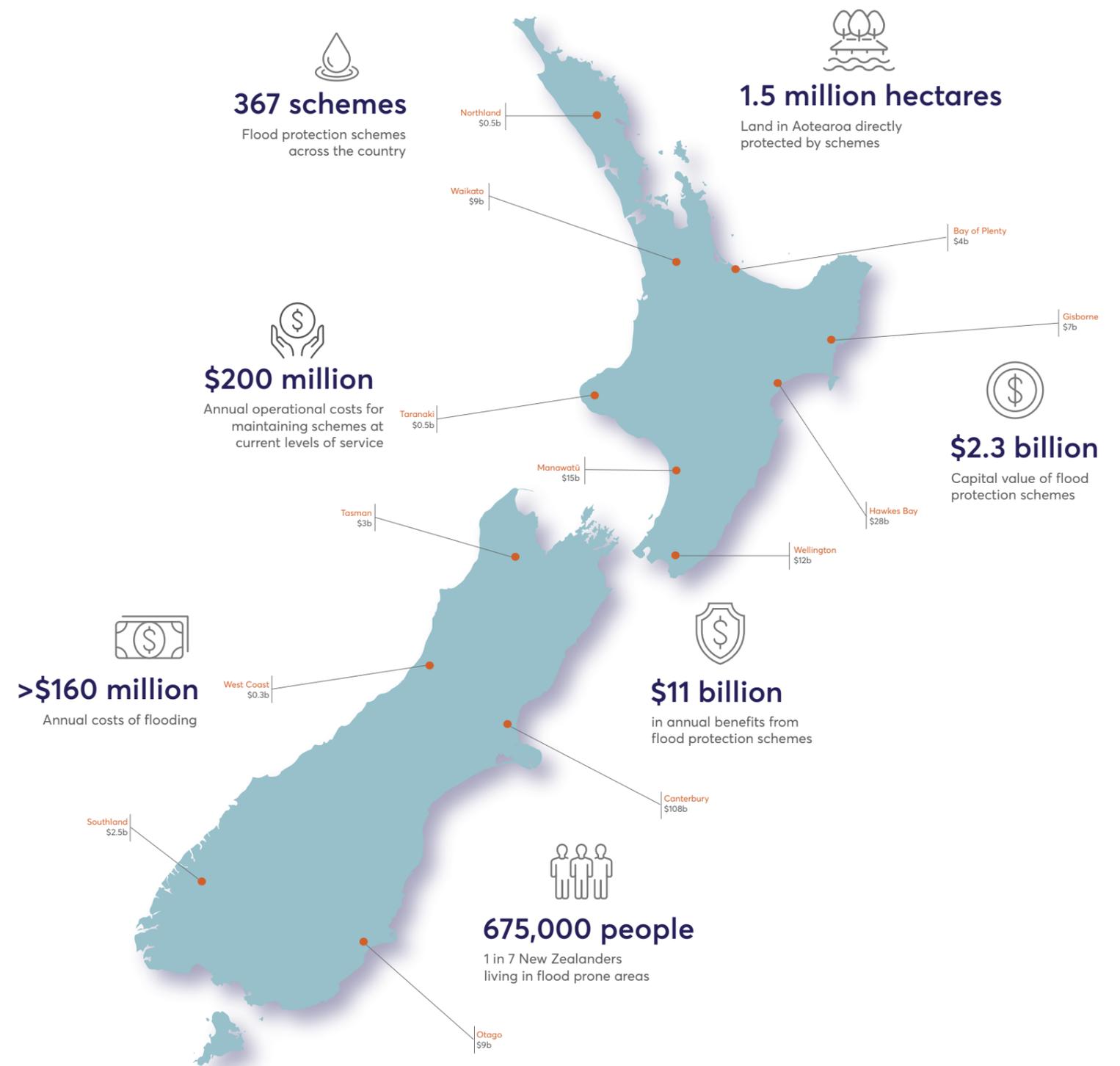
Combined, these schemes represent a total capital value of 2.3 billion, with \$200 million in annual operational expenses. Yet, the total estimated value of their benefits is \$11 billion each year.

Thus, flood protection schemes in their current state produce a benefit-to-cost ratio of around 5:1. For comparison, large economic infrastructure projects are considered economically viable if this ratio is greater than 1:1.

Despite the billions of dollars in benefits, river management and flood protection has been largely absent from conversations around water management and three waters.

These schemes have also received no direct central government funding over the last three decades despite Crown assets being protected. In the face of rising costs and growing challenges round local ratepayers' ability to fund the necessary level of investment, the current state is neither equitable nor sustainable.

Source: Tonkin & Taylor (2018). *Hiding in plain sight: An overview of current practices, national benefits and future challenges of our flood protection, river control and land drainage schemes*. Report for River Managers' SIG.



# Key risks and challenges

## A 2018 assessment identifies crucial risks and challenges for the sector.

In 2018, the River Managers' SIG commissioned a current state assessment of New Zealand's flood management system, which at the time comprised 364 schemes. This seminal report produced by Tonkin+Taylor has largely informed our understanding of the key risks and challenges with the current flood management system.

### Key risks

A central finding was that most river management and flood protection schemes were constructed up to half a century ago; yet the value of the assets they protect - both directly and indirectly - has steadily increased. Adjacent urban development has also intensified.

In most cases the value of these protected assets is disproportionately higher than the value of schemes themselves. Consequently, schemes may be under-designed for what they protect and enable, creating risks of asset failure.

Our understanding and assessment of risk has also advanced since many of these schemes were first constructed. Resultantly, there are risks of some schemes being unfit for purpose and failing to deliver on expectations of performance or agreed levels of service.

Finally, these schemes were not designed for the accelerating climate change we are now experiencing and a step change is needed to ensure they provide fit-for-purpose safety and security for future generations.

### Additional challenges

First, as mentioned earlier, a key challenge for the river management sector is the current funding model which creates financial pressures and forces staff to "make do" by cutting expenses to fund unplanned but necessary activities; counter to best practice. This also has implications for the future affordability of schemes, as ratepayers will be unable to shoulder increasing costs alone.

Second, integrated catchment management requires a high level of expertise as well as continuity of institutional knowledge to maintain and upgrade schemes. This specialised work is currently done by a small number of expert staff which further creates further pressure on river management activities and can constrain the delivery of successful community outcomes.

Finally, with the upcoming changes to the Resource Management Act and the work underway by NIWA to develop a national flood risk database, regional and local councils are operating in somewhat of a policy gap. In the absence of a systematic framework, councils have been forced to adopt a more pragmatic approach

to river management and flood mitigation activities, with a focus on building protective infrastructure.

However, the growing impacts of climate change on flood risks necessitates drawing from a bigger toolkit in order to adapt to these impacts and develop more effective flood resilience strategies.

Together, this suggests that additional resourcing and detailed analysis will be required to develop a pragmatic roadmap for flood resilience over the coming decades. Te Uru Kahika is seeking co-investment to enable this programme of work.

Sources: Tonkin & Taylor (2018). *Hiding in plain sight: An overview of current practices, national benefits and future challenges of our flood protection, river control and land drainage schemes*. Report for River Managers' SIG; Walsh, P., Robertson, T., & Paulik, R. (2019). *Flood Mitigation Schemes in New Zealand: How is Protection Distributed?*



Image: Christchurch flooding (NIWA)

# An integrated approach to flood protection

A multi-dimensional approach is needed to manage natural hazards in a climate changing world.

PARA offers an integrated suite of approaches for building community flood resilience.

Amongst the frameworks guiding flood management, PARA represents a comprehensive and internationally recognised model, used by NEMA, DIA, and the Ministry for the Environment. With its origins in climate change adaptation planning, PARA provides an effective framework for flood risk reduction and building community resilience.

This framework includes four approaches, as illustrated in the figure at right:

- **Protect**, which involves physical structures (e.g., sea walls, levees, dunes) and systems designed to keep flood waters away from homes, buildings, communities, and critical infrastructure. However, this can fail during larger-than-expected flood events and remains infeasible as a climate adaptation strategy.
- **Accommodate**, using strategies that allow for continued use of flood-prone areas through enhancing community preparedness and resilience and/or limit the extent of flood damage (e.g., elevating homes and buildings, flood-proofing, flood storage areas, and recent proposed changes to making flood risks clear in LIM reports).
- **Retreat**, or the permanent relocation of homes, buildings, and infrastructure in flood prone regions to safer areas. The evacuated land is then either restored to wetlands or re-purposed as recreational spaces.
- **Avoid**, which includes approaches that proactively

prevent development (residential and commercial) in flood-prone areas through planning and policy controls.

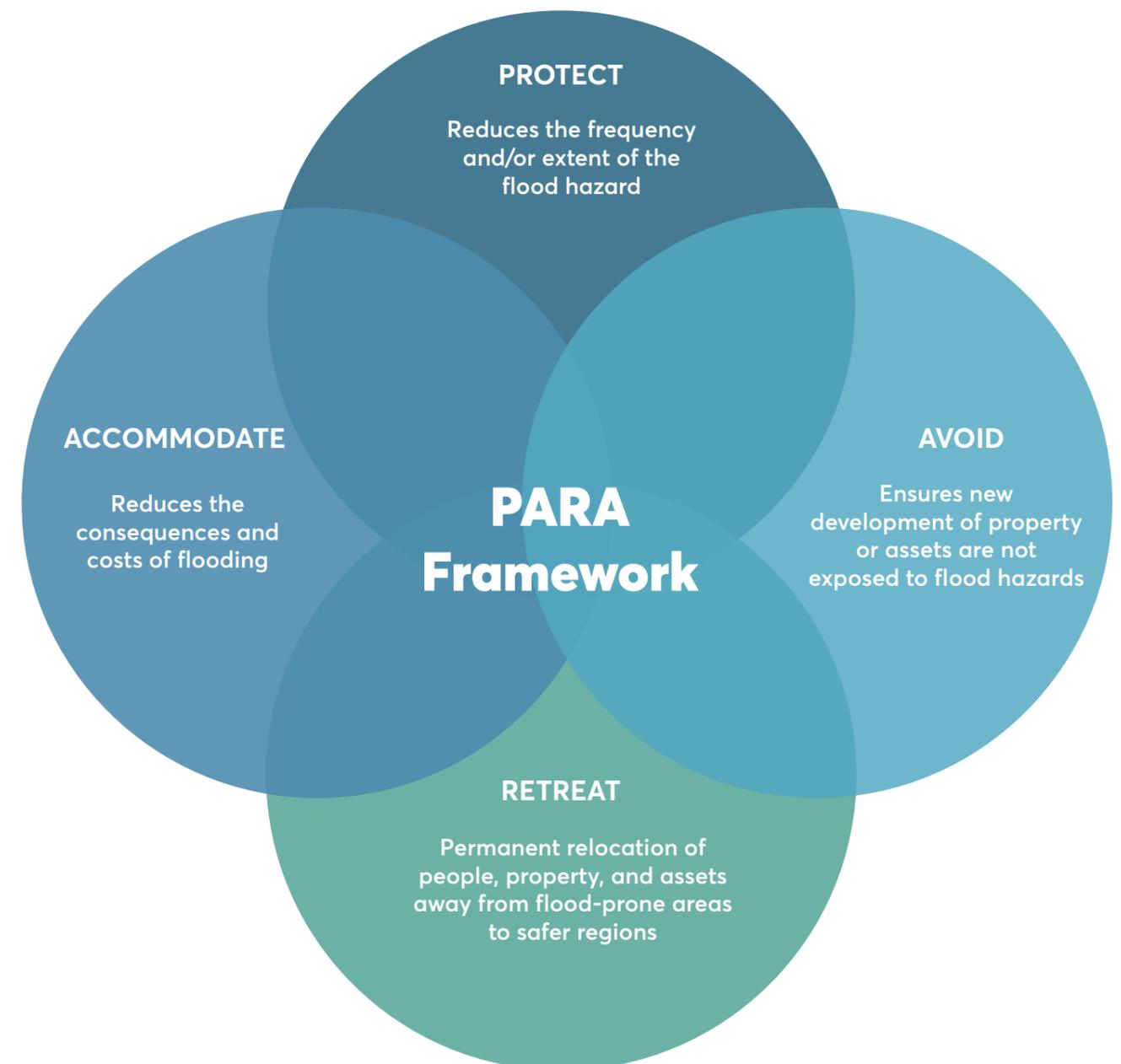
No single approach on its own can provide flood resilience. Instead, the framework is intended to guide the implementation of an integrated package of approaches, with considerations given to the local context as well as issues such as equity.

More recently, Te Uru Kahika have extended the application of the PARA framework to include a 'transfer of risk' option through insurance markets, creating in essence a 'multi tool' approach to meet increasingly complex challenges in a climate change world.

The effectiveness of PARA as a framework relies on accurate flood mapping and modelling. This work is currently in progress alongside other legislative and policy initiatives that recognise the need for a multi-tool approach to natural hazard management and climate change.

This proposal recognises that while a comprehensive multi-tool PARA approach is crucial to building long-term flood resilience in Aotearoa, further work, time, and partnership with mana whenua is needed before we can be confident in its effective implementation.

In the interim, protection does and always will play a critical role in flood risk management, especially for our most vulnerable communities - as identified in a recently released DIA report.



Source: Doberstein, B., Fitzgibbons, J., & Mitchell, C. (2019). *Protect, accommodate, retreat or avoid (PARA): Canadian community options for flood disaster risk reduction and flood resilience*. Natural Hazards, 98(1), 31-50.

# Flooding and vulnerability

Flood resilience is shaped by community capacity and pre-existing vulnerabilities.

Framed through the lens of vulnerability, flooding is both a wellbeing and social justice issue.

**Resilience** is the ability to prepare for and absorb the impacts of floods and other natural hazards, at the individual, community, and state level. With the devolution of our flood management systems to regional and local councils, resilience tends to be discussed mainly at the community level.

Community resilience is determined by capacity to respond to hazards as well as pre-existing vulnerabilities. This capacity can take the form of knowledge and preparedness; protective infrastructure; economic resources, social networks and capital; as well as institutional arrangements.

**Vulnerability**, on the other hand, reflects a restricted ability for individuals or communities to respond to floods, resulting in harm to their wellbeing.

Reviewing the research, the following dimensions have consistently been linked with vulnerability:

- **Socioeconomic deprivation** including low income, limited financial resources, being a renter, poor housing conditions, and limited or no insurance coverage
- **Geographic location** through flood exposure in the first instance, with rural areas also facing access challenges during and post-floods

- **Age**, with children and older adults being most vulnerable to flood risk as they tend to be more reliant on caregivers, less mobile, and more susceptible to health impacts
- **People with health needs and/or disability** who may be susceptible to stress and the physical impact of floods, and may be adversely impacted by disruptions or lack of access to health and emergency services
- **Social isolation** or lack of social support
- **Gender**, with women in particular shouldering the brunt of care, domestic work, and experiencing a greater risk of domestic violence during and post-flooding
- **Minority ethnicity and marginalised groups** who may lack political power; social and economic capital; and experience racism

However, vulnerability is not simply the opposite of resilience: individuals can be vulnerable and still be resilient to the impacts of flooding through protective infrastructure and/or their ability to draw on other forms of capital. Income, for instance, consistently remains one of the most protective factors. Thus, factors interact to promote or erode resilience, with vulnerability being dynamic across time and contexts.

A recent report commissioned by the DIA provides preliminary insights on the state of vulnerable communities' exposure to flood hazard in New Zealand. Focusing on the socioeconomic aspect of vulnerability, the report looked at communities that are both exposed to flood hazard and have high levels of deprivation.

Of the 75 communities identified, 44 had no flood protection infrastructure planned and had limited financial capability to fund flood risk responses. They also tended to be small, mostly rural communities located on riverbanks or along the coast.

This report provides some insight into how vulnerability to flood risk may be layered by deprivation and geographic location in New Zealand. A more holistic examination, using a broader set of indicators and factoring in the impacts of climate change, will be able to shed light on how age, health status, gender, and ethnicity further compounds this vulnerability.

Vulnerability to natural hazards is therefore linked to underlying socioeconomic, health, and political inequalities. In Aotearoa, vulnerability is further underpinned by the history and ongoing impacts of colonisation, with Māori in particular experiencing ongoing social, economic, and health inequities.

Framed through the lens of vulnerability, it becomes evident that flooding is both a wellbeing and social justice issue. We therefore need flood resilience initiatives that account for existing community capacity and vulnerabilities, as well as how the impacts of climate change are likely to be felt across different groups and communities.

Resilience can also be reactive or proactive. The former is about resistance and a return to status quo post-disaster, whereas the latter is about finding ways to adapt to and change existing conditions in the face of future threats.

While our flood response and management has largely been focused on protection and reactive resilience, growing climate change-induced risks will necessitate a shift in our approach toward proactive resilience through use of a full spectrum of tools available within the PARA framework and Te Mana o Te Wai.

Sources: Twigger-Ross, C., Brooks, K., Papadopoulou, L., Orr, P., Sadauskis, R., Coke, A., ... & Walker, G. (2015). *Community resilience to climate change: an evidence review.*; Mason, K., Lindberg, K., Haenfling, C., Schori, A., Marsters, H., Read, D., & Borman, B. (2021). *Social vulnerability indicators for flooding in Aotearoa New Zealand.* International Journal of Environmental Research and Public Health, 18(8), 3952.; DIA. (2020). *Vulnerable communities exposed to flood hazard report.*

# The wider context of Te Mana o Te Wai

Te Mana o Te Wai provides a set of principles for freshwater management in Aotearoa.

**The interconnectedness of our taiao means our river management and land use practices need to be integrated into management of our freshwater ecosystems.**

Alongside the PARA framework, our approach to flood management and resilience must also be informed by Te Mana o Te Wai: the first principle for freshwater management in Aotearoa.

Our National Policy Statement for Freshwater Management sets out principles for implementing Te Mana o Te Wai as well as a hierarchy of obligations, prioritising:

- first and foremost, the health and wellbeing of the water,
- next, the health needs of people, and
- finally, the use of water for other social, economic, and cultural purposes.

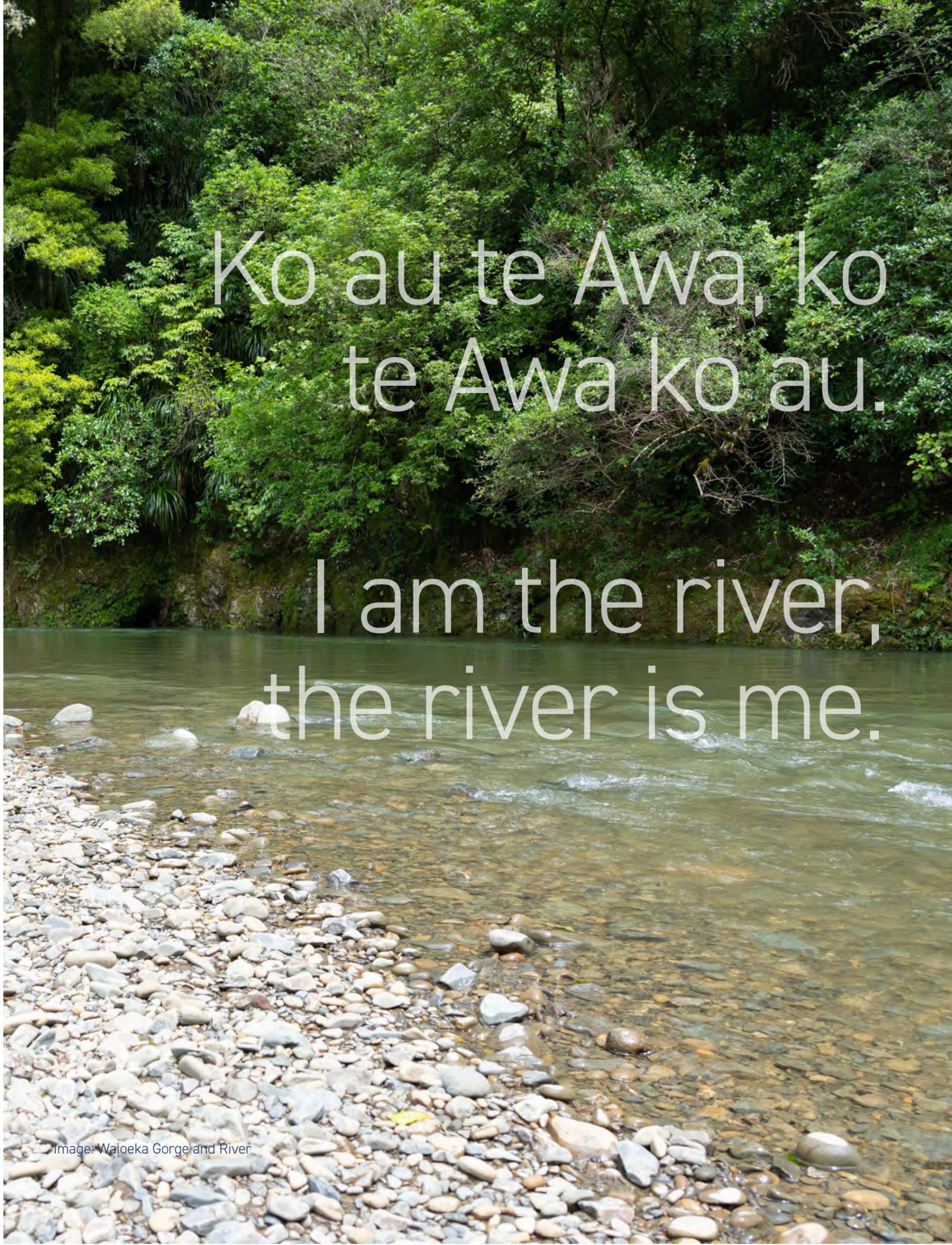
Since awa (river) and other water bodies sustain life they are central to our communities' the health and wellbeing, both now and in the future. This also positions awa as ancestral forces and their own entity rather than a resource to be used or a hazard to be controlled. Indeed, the granting of legal personhood to the Whanganui River in 2017 exemplifies this thinking.

Sustainable river management approaches therefore increasingly give consideration to working "with" nature rather than necessarily controlling it. This involves a delicate balance between letting the river flow freely while

maximising public and economic benefits from protecting assets along river corridors.

Te Mana o Te Wai also recognises the particular significance of tangata whenua's relationship with water (and land). Regional councils therefore need to work in partnership with iwi and hapū on freshwater/river management in applying Te Mana o Te Wai at a local level, ensuring this is a Tiriti-based partnership.

This mātauranga Māori concept also recognises the interconnectedness of our taiao (environment). Thus, our river management and land use practices need to be integrated into management of our freshwater ecosystems, giving rise to the concept of healthy catchments that collectively improve our community resilience against flooding as well as climate change.



Ko au te Awa, ko  
te Awa ko au.

I am the river,  
the river is me.

# Why flood resilience is critical to Aotearoa

Flooding impacts on cultural, economic, social, and environmental wellbeing.

Since flooding is a wellbeing issue, we need to look at its impacts holistically.

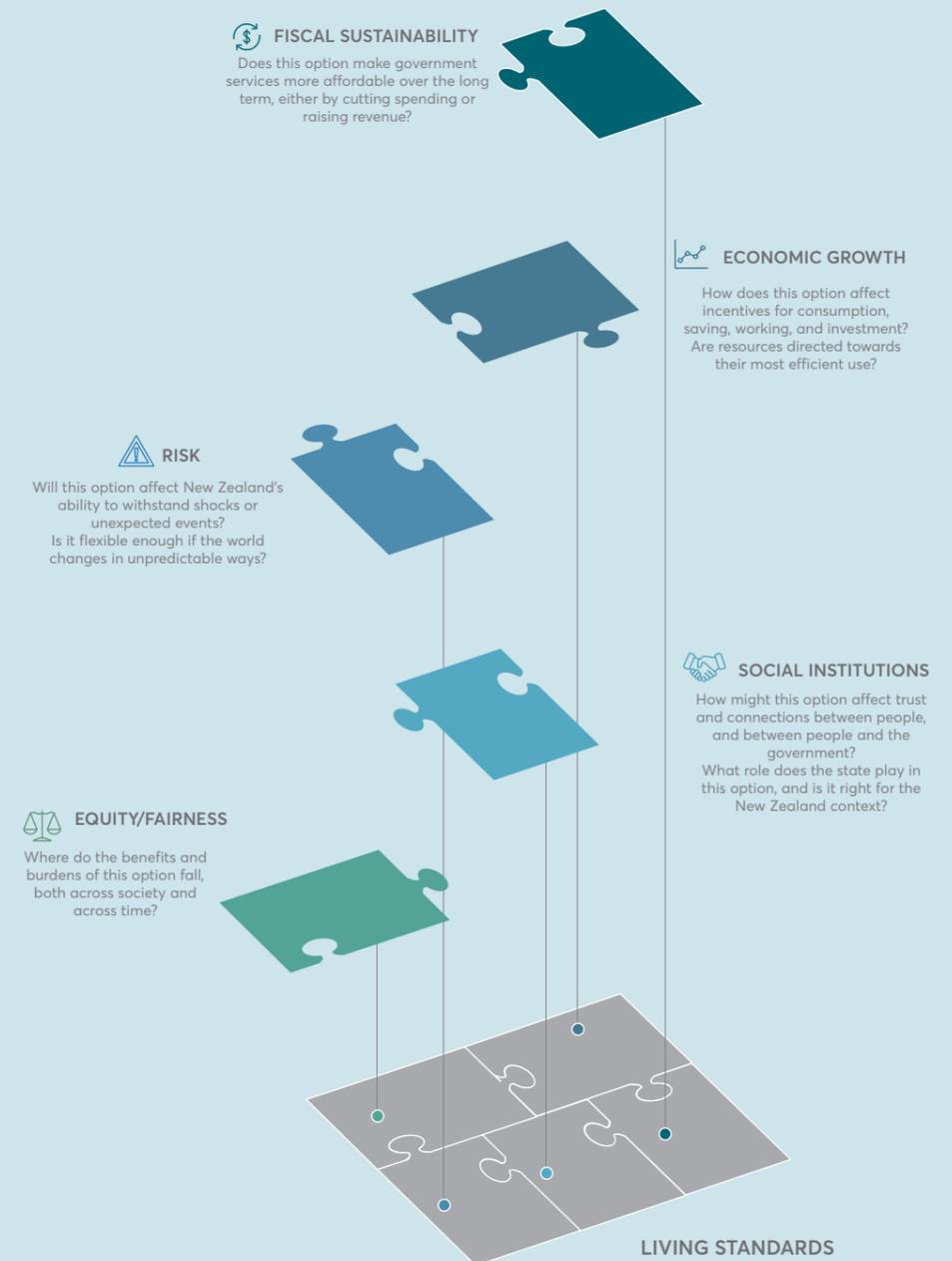
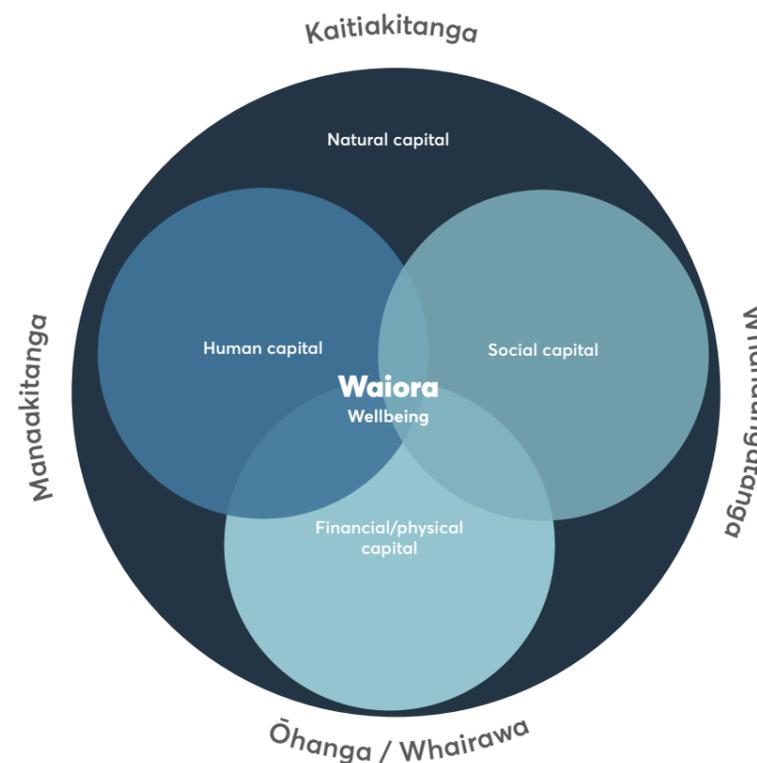
While analyses tend to focus mainly on the economic impacts of flooding - namely, the costs associated with damage and recovery - flooding also has impacts on our wellbeing as a society.

The diagram at right is the Productivity Commission's updated view of how the wellbeing domains interact. At the core of wellbeing is a liveable environment, preserved and enhanced through kaitiakitanga. Within this sphere the other wellbeings - human, social and economic - contribute to the waiora of Aotearoa.

These four domains directly map onto Treasury's multidimensional wellbeing (living standards) framework, and are interrelated. Indeed, many social, cultural, and environmental impacts themselves have economic implications.

It's also important to note that flooding impacts the wellbeing of individuals and whānau, communities, and the entire nation. These impacts can be enduring in the long term across several generations, and can compound intergenerational inequities - particularly for vulnerable groups.

Thus, in order to appreciate the magnitude and importance of flooding as a wellbeing issue we need to look at its impacts holistically.



# The negative economic impacts of flooding

**Flooding creates a significant economic burden, in terms of immediate and long-term costs, for the entire nation.**

Flooding creates a significant and long-term economic burden on flood-impacted communities and the nation.

## Costs of damage

First we consider the immediate costs incurred through damage to housing, buildings, farm lands and crops, and other major infrastructure. Some of these costs may be covered via property insurance plans, with selected flood damage costs also being covered by the Earthquake Commission.

However, insurance payouts may not fully cover rebuild and replacement costs, meaning those on lower incomes and/or renting are less able to rebuild post-flooding. Relocation for these households may also be too expensive or infeasible as it requires leaving jobs, schools, and support networks. Resultantly, these individuals may have to take on additional debt or in extreme cases, face homelessness.

Such impacts may be felt disproportionately by those in regions of socioeconomic deprivation or low household income - a phenomenon known as 'poverty exposure bias' where poor households are more likely to be exposed to natural hazards by living in the least resilient housing and in the areas at greater risk of floods, as determined by affordability.

Intersecting factors such as age, gender, ethnicity, migrant status, health, employment, and even geographic location can magnify these challenges, creating an enduring poverty trap.

Major flood events can also cut-off access to roads and transport networks as well as entire towns; impacting food supply, delaying first responders, affecting evacuation and recovery, disrupting employment and childcare, and reducing access to key amenities.

Power outages caused by floods can also create further challenges for the medically-dependent, young, and old. Those with disabilities may be prevented from being made aware of and/or responding to floods appropriately and in a timely manner, further impacting their ability to cope. Once again the brunt of these impacts are likely to be experienced by those with fewer financial and social resources.

There are also the costs associated with damage to high value Crown-owned assets such as airports, hospitals, schools, and other infrastructure, likely ranging in the billions.

## Costs of response and recovery

While a significant portion of the costs of damage and recovery fall to the flood-affected communities, central government also typically plays a role in flood response through deploying the civil defence force, NEMA, and other relief agencies to assist with recovery.

Central government also meets up to 60% of the repair costs of critical infrastructure, beyond a certain threshold, although this level of assistance is currently under review. Recovery funding is also on a 'like for like' basis rather than for betterment; thus this investment is unlikely to result in future

improvements.

Further, there are sizeable costs associated with injury, and in extreme cases fatalities, although the associated healthcare and social assistance costs - such as re-homing displaced residents, treatment, and rehabilitation - are accrued over the long term.

Indeed, the government's thirty year infrastructure plan estimates that the average annual cost of flooding exceeds \$50 million. These costs also represent a significant liability for the government in terms of unplanned expenditure.

## Broader economic costs

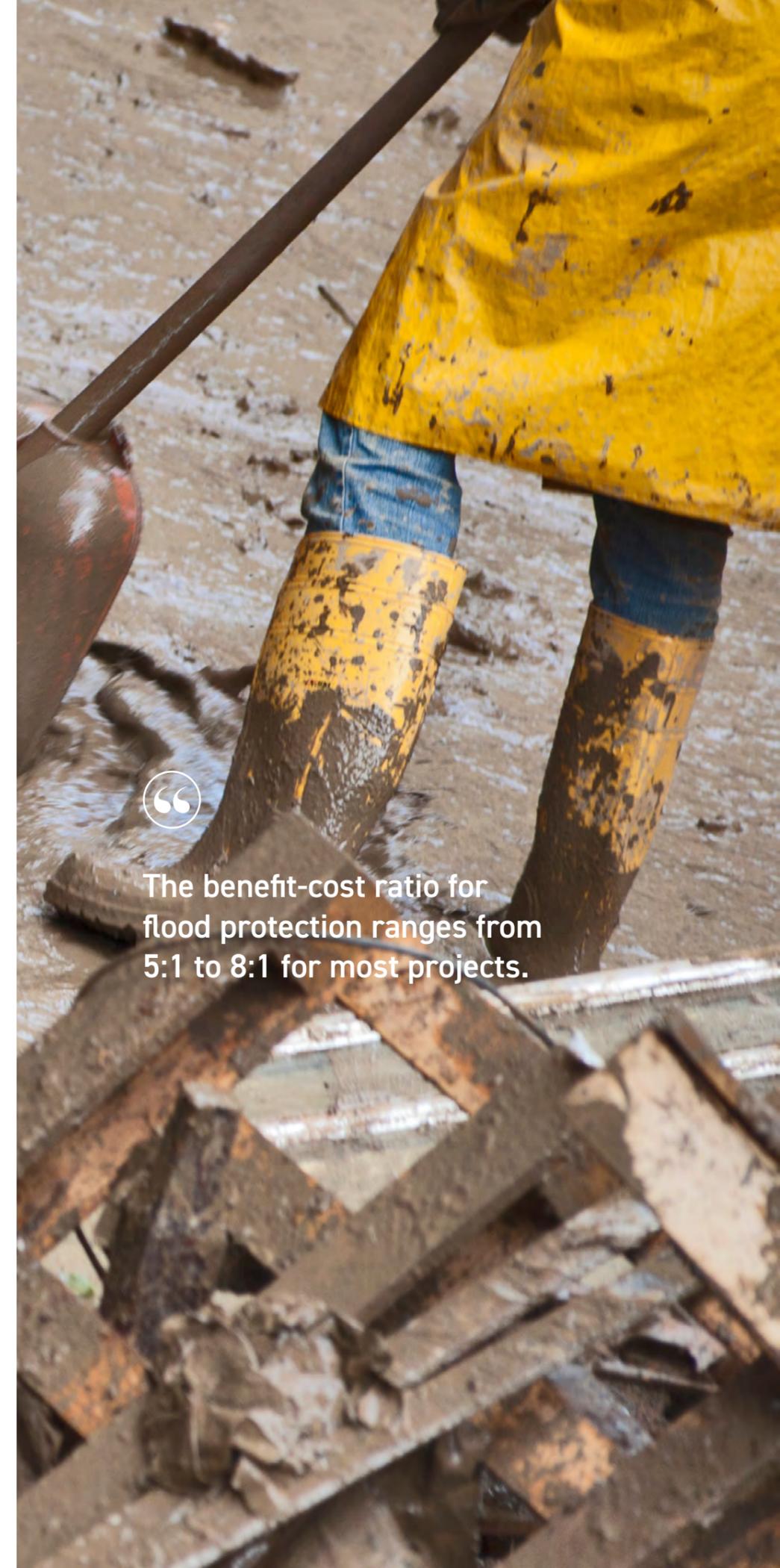
There are also broader economic costs associated with social and business disruption, such as losses in production from businesses being unable to operate, disruption to schooling, disruption to supply chains, and damage to natural and cultural heritage.

In the long run these costs are borne by the entire nation. The re-allocation of public funds to flood response and repair of infrastructure means taxpayers are paying twice for flood management.

Further, increasing flood risk will detrimentally impact property values while also resulting in increasing insurance premiums, with the looming threat of partial or full insurance retreat in high flood-prone regions over time.

Overall, the financial costs alone present a compelling case for investment in preventative action versus responding to floods.

Source: New Zealand Government. (2015). *The Thirty Year New Zealand Infrastructure Plan*. Retrieved from [www.infrastructure.govt.nz](http://www.infrastructure.govt.nz)



**The benefit-cost ratio for flood protection ranges from 5:1 to 8:1 for most projects.**

# Social impacts from flooding events are significant

**Flooding represents a social justice issue when we consider the 'double whammy' of economic and social harm experienced by vulnerable groups.**

Floods can have significant and long-lasting social impacts on affected individuals and communities - often equalling or exceeding the direct damages from flooding - with spillover effects in adjacent non-flooded regions.

For one, there are the immediate stressors associated with damage to property and belongings, evacuation, disruption to daily life, and even loss of income or employment. Low income households particularly might experience a significant toll on their wellbeing since they may live in less resilient homes and regions, with fewer financial resources.

Flooding can also disrupt social connections and access to community networks and support, particularly when families have been displaced from their homes and communities. This can result in isolation and loss of social cohesion, and can have further ramifications for relocation and people's willingness to live in certain areas.

The health impacts of flooding - both physical and mental - are also significant and can interact with pre-existing health status. These health risks can once again vary based on socioeconomic factors such as income, ethnicity, age, health status/ disabilities, and gender.

There are also more general health risks associated with water contamination and other

water borne diseases spread through floods. Flood-impacted housing can retain moisture and in the long-term cause other health issues due to dampness and mould. Flooding itself can result in serious injuries and in extreme cases loss of life.

It can also take a significant toll on mental health, with anxiety and depression being the most commonly reported mental health issues post-flooding. More generally, there can be enduring psychosocial trauma from loss of loved ones, damage to property and personal belongings, displacement, and disruption to livelihoods and social functioning. The financial stress brought on by flooding, combined with reduced support, can further aggravate rates of domestic violence post-disaster.

It is also worth noting the broader political ramifications of flood events and the associated government responses. If the public perceive that recovery or relief responses were ineffective or disproportionate to the scale of the damage, or that the flood risk could have been better managed in the first instance, this can generate public discontent and loss of trust and confidence.

Considering the 'double whammy' of vulnerable groups experiencing both economic and social harm, we can see how flooding is a social justice issue that has the potential to exacerbate existing inequalities in society.



Isabella Ngawati evacuates her Otiria Rd home with six-month-old son Elijah. Flooding in Moerewa, 18 July 2020 (Northern Advocate photo by Peter de Graaf)

# Our culture is adversely impacted by flooding

**Flood damage to culturally significant sites can have intergenerational impacts on physical, mental, and spiritual wellbeing for tangata whenua.**

Floods can cause significant damage to cultural heritage sites, although these impacts can be difficult to fully quantify. In Aotearoa there are numerous cultural and historic assets, including marae, urupā and indeed many Māori businesses, that are located directly in flood prone areas and along coastal margins.

Coastal regions in and of themselves are taonga as they provide a source of kaimoana; a means of access and communication for iwi and hapū; contain a number of culturally-significant archaeological sites and assets such as marae and urupā.

Around 80% of the 800 marae across the country are based in low-lying coastal areas and flood plains. These sites represent both a source of economic value and cultural identity.

Flooding and damage to culturally significant assets can therefore be detrimental to tangata whenua, resulting in a loss of connection to their land, identity, and sense of belonging. This can have flow-on impacts on physical, mental, and spiritual wellbeing, for generations to come.



Image: Ōtūtaopuku Urupā, Ōpōtiki, adjacent to the Ōtara River

# The environment suffers in flooding events

The true environmental impacts of flooding will be realised in the long term and for generations to come.

While floods are an essential natural renewal process and can benefit nature and society, they can also have detrimental environmental impacts. In light of growing climate change induced flood risks, this presents a significant cause for concern.

In addition to the impacts on human lives, flooding can disrupt entire ecosystems by destroying or displacing aquatic life and their habitats, creating toxic algal blooms, degrading water quality, depositing harmful sediments, and polluting bodies of water. Contaminated water also poses a threat to nearby industrial, agricultural, and residential areas.

Floods can also damage land through erosion of riverbanks and coastlines, causing them to collapse. This erosion can also create further risks to land used for primary sector productivity, especially farmland.

There is also the environmental harm from disposing large volumes of damaged building and household waste. The recent July 2021 flood in Westport alone resulted in more than 2,100 tonnes of flood-affected building and domestic waste being sent to landfills.

Chemicals, debris, and sewage can further pollute water quality and impact marine life if it enters the ocean, creating a further unquantified financial and environmental cost.

Ultimately, impacts on the environment cannot be separated from the social, cultural, and economic aspects of wellbeing. Indeed, a Te Ao Māori worldview recognises the interconnectedness amongst all living and non-living things, and of each generation to those before and after. In this way, the true environmental impacts of flooding will only be realised in the long term and will be felt for generations to come.

Source: *Buller Flood Recovery*. Retrieved [www.bullerrecovery.org.nz](http://www.bullerrecovery.org.nz)



# Case study: Westport

Westport flooding (NZ Defence Force)



We have been evacuated three times in four years. It's just awful and stressful. People are worried every time it rains. We love the house, we love the area but it looks like we are a bit doomed here... What's the point in living here any more?

## The back-to-back major flooding events in Westport have adversely impacted economic, social, and psychosocial wellbeing of the community.

Sitting on a floodplain, between two rivers and the sea, the town of Westport is one of the most flood prone regions in Aotearoa with a history of major flooding events including in 1873, 1926, 1970, 2018, and more recently in 2021 and 2022. The Buller District is also one of the most deprived regions - ranking in the 92<sup>nd</sup> percentile nationally - with the lowest household income level nationally. Mining and agriculture are mainstays of the local economy.

From 15<sup>th</sup> to 18<sup>th</sup> July 2021, a major flooding event saw the Buller River reach a peak flow of 8900 cubic metres per second; the largest river flow ever recorded in New Zealand history. More than 2000 people were evacuated from over 826 properties as a result of the flooding, and nearly a quarter of the town's housing stock was damaged or deemed unsafe for occupation. The damage to housing alone represented an estimated \$88 million in insurance claims that have been settled to date.

Unfortunately, while Westport was still recovering another major flood occurred in early February 2022 leading to further evacuations, damage to homes and infrastructure, access to the town being cut off, and a State of Local Emergency being declared.

Initial damage assessments carried out in late February estimated between \$21.5 and \$43 million in damages from the two severe weather events. This represents costs in damage to crucial infrastructure such as roading and water supply, removal of domestic waste, and damage to at least 70 farms district wide.

On top of the damage to housing and infrastructure, and disruption for business and the local economy, there are also the psychosocial impacts for residents who have been displaced by the flooding. More than a year on from the July floods, less than a fifth of the homes have been

fully repaired and the community continues to face challenges with recovery with residents feeling anxious about the future.

A reliance on ratepayers rather to fund river management and flood protection schemes has seen decades of underinvestment from central government in flood protection in the region, as with the rest of Aotearoa.

Indeed, the River Managers' SIG has estimated that the scale of flood-related damage might have been prevented by a relatively modest earlier investment of between \$10-20 million in flood protection work at Westport. In contrast, the costs of recovery are estimated at close to \$100 million.

These damage and recovery costs will now fall to the community, representing a significant financial burden on a small ratepayer base in a region with high levels of socioeconomic deprivation. This approach to flood mitigation and response is therefore no longer tenable.

Sources:  
Buller District Council. (30 June 2022). *Kawatiri Business Case*. Retrieved <https://bullerdc.govt.nz/flood-resilience-package-signed-off-by-councils-and-iwi/>; Buller District Council. (23 February 2022). *Cost of February flood events*. <https://bullerdc.govt.nz/cost-of-february-flood-events/>; Stuff.co.nz. (15 July 2022). *More than 400 homes still not repaired one year on from Westport floods*. Retrieved from <https://www.stuff.co.nz/the-press/news/west-coast/300636197/more-than-400-homes-still-not-repaired-one-year-on-from-westport-floods>; Te Uru Kahika River Managers SIG. (2022). *Central government co-investment in flood protection schemes*. Retrieved from [ignz.co.nz](https://ignz.co.nz)



Buller floods (NZ Defence Force)

# Case study: Westport

Co-investment from central government will enable a long-term flood risk mitigation scheme that builds community resilience.

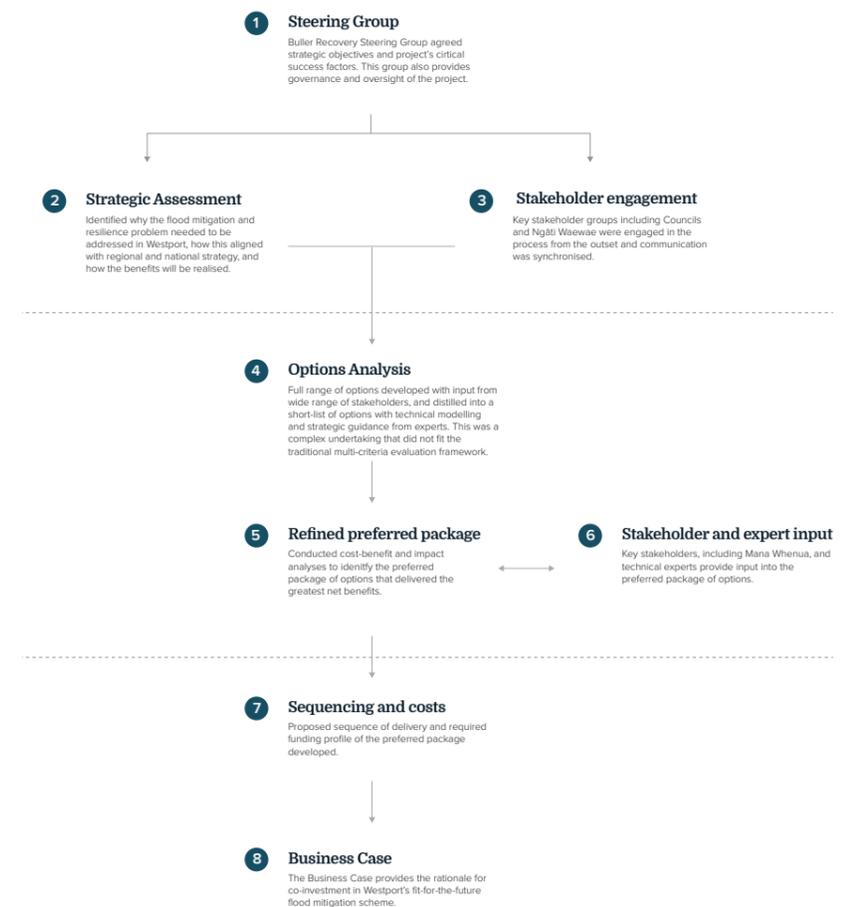
The \$56 million Kawatiri business case will be a test case for future co-investment in flood protection schemes across Aotearoa.

The government responded rapidly to the flooding by providing support and recovery relief, through NEMA and other agencies. However, without ongoing central government co-investment, Westport remains unable to implement a flood risk mitigation scheme and develop community resilience against future flooding events and the impacts of climate change.

Recognising this, in February 2022 Hon Minister Mahuta jointly invited the West Coast Regional Council and Buller District Council to submit a proposal for central government co-investment that would support recovery and enable longer term flood resilience in the District.

The figure on right provides an overview of the Kawatiri business case process. This \$56 million business case was developed based on the internationally recognised Protect, Avoid, Retreat/Relocate, Accommodate (PARA) model. Each interdependent component represents a parallel work tranche of work, enabling a multi-tool, long term approach to building community resilience against flooding.

In many ways, the Westport business case will be viewed as a test case for more widespread central government co-investment in flood protection schemes across New Zealand.





# Case study: Kaitāia

**The Awanui River Flood Scheme has delivered a higher level of protection for Kaitāia and surrounding areas.**

**Co-investment from central government in the Awanui catchment works has already demonstrated considerable benefits during major flood events.**

Similar to Westport most settlements in Northland are located on floodplains. This, coupled with the region's weather systems mean that many towns - including Kaitāia - are at a high risk of flooding.

Recognising the elevated risk to Kaitāia due to stopbanks that could be overtopped in large flood events, the Northland Regional Council (NRC) looked at upgrading existing flood protection schemes with a particular focus on the Awanui River Flood Scheme.

The scheme was reviewed and included in the council's Long Term Plan 2018-2028. In total, the \$15.5 million project began in 2019 and was expected to be completed in 2027. Works included updating flood risk to capture climate change projections; extensive improvements to stopbanks; building an emergency spillway, and maintenance.

Funding for the programme was split 30:70 between regional and local rates. However, a \$8.5 million grant received through the government's Covid-19 recovery response funding has accelerated the Awanui catchment works by five years, with completion now anticipated in 2022.

These upgrades were designed to help future-proof the scheme - including predicted climate change impacts - and deliver a considerably higher level of protection for Kaitāia and surrounding areas in the long-term.

The programme has already demonstrated considerable benefits to date. Work completed prior to the government funding meant that in the July 2020 storm there was very little flooding despite the significant volume of floodwaters.

More recently, the scheme has yet again demonstrated its efficacy and value in the 1:100 year storm event in August 2022 - Kaitāia's biggest weather event since 2007 - that saw the town's access cut off along with slips on road networks. Once again, despite heavy rains and power outages, no homes required evacuation and the town was spared from an estimated \$50 million in potential damage as well as risk to people's lives.

Central government investment in the Awanui River Flood Scheme is an example of the excellent return on investment in flood protection and management with benefits already being evidenced even whilst the scheme is undergoing upgrades, including creating employment opportunities for 40 people.

This is a testament to the importance of central government co-investment in flood protection and resilience; both in terms of expediting crucial work needed to respond to growing flood risks and in terms of the value these investments produce for both communities and the wider nation.

Source: Northland Regional Council. Retrieved [www.nrc.govt.nz](http://www.nrc.govt.nz)

# The impact of climate change

**Flooding challenges are growing in magnitude as the climate crisis deepens.**

**Climate change acts as a risk multiplier further threatening our flood resilience.**

International evidence shows increases in the frequency and severity of weather-related disasters such as floods; attributed largely to the impacts of climate change. Climate change is linked to flooding through two pathways.

First, sea levels rise is predicted to rise by up to 1.3m over the next 100 years, depending on future emissions reduction. Rising sea levels increase the impact of storm surges, exacerbate coastal erosion, and increase the likelihood of coastal inundation and flooding.

Second, climate change through temperature increase is predicted to impact precipitation patterns and river flows; up to 30% increase in peak river flows. This will lead to more frequent storms and extreme rainfall events. This increases the risk of pluvial and fluvial flooding through greater storm surges, eroding river banks, depositing of sediments, and widening rivers.

Importantly, Aotearoa's extended coastline and geographic location in the path of the 'roaring 40s' westerlies means that as a nation we are especially susceptible to experiencing climate-induced extreme weather events. This makes the challenge we face greater than many other countries, and places further strain on our existing flood protection schemes.

More frequent and intense floods will result in a greater magnitude of flood damage. Since most of New Zealand's towns and centres are located along the coast or on floodplains of major rivers, our coastal

communities are likely to experience more damage to assets, property, and business as a result of increased flood risk.

The recently released National Adaptation Plan 2022-2028 also identifies Māori as particularly vulnerable to climate change impacts since they rely on the natural environment as a cultural, economic, social, and spiritual resource. This will further exacerbate existing health and socioeconomic inequities already being experienced by many Māori.

While some of the costs of flood damage are typically recouped through private insurance coverage, the insurance industry is recalibrating its calculation of predictable risks to adjust to climate change.

Increasing flood events will therefore lead to successive increases in insurance premiums as well as partial and full insurance retreat, as already seen in parts of the United States such as Louisiana.

In New Zealand research has conservatively predicted insurance premium hikes within the next ten years, with more than 10,000 houses across Wellington, Auckland, Christchurch, and Dunedin experiencing full insurance retreat by 2050. Higher insurance premiums and retreat will create lasting effects for vulnerable communities who will be unable to rebuild and fully recover before the next flood event, with enduring impacts on intergenerational wellbeing.

Additionally, the wider financial sector is also

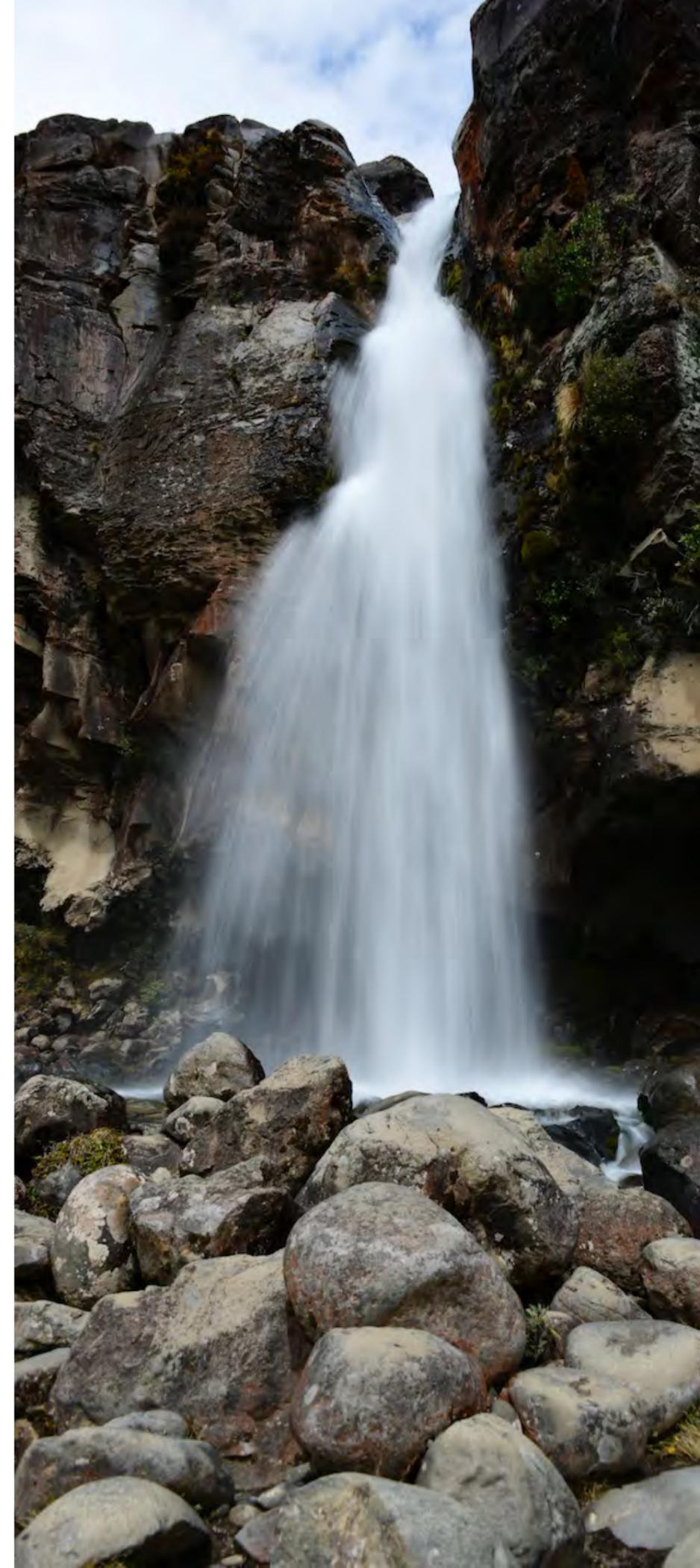
undertaking assessments with a view to improving their climate risk exposure and management. Recently released findings point to the potential for a significant proportion of homeowners seeing a decrease in their property value as our understanding of climate risk improves. Indeed, in Auckland more than a quarter of mortgage lending was for properties in a flood zone.

In this way, the impacts of climate change will be disproportionately felt by low-income households and vulnerable groups, including the elderly and those with disabilities. These impacts will be even more strongly felt by those communities exposed to multiple hazards beyond floods alone.

We can therefore see that climate change acts as a risk multiplier; in this instance, further threatening our nation's flood resilience. However, it is not just the occurrence of natural disasters, but how governments mitigate and respond to them, that contributes to growing inequality.

Improved flood resilience therefore remains a crucial first step in adapting to climate change.

Sources: Ministry for the Environment. (2017). *Coastal Hazards and Climate Change*. Retrieved <https://environment.govt.nz/assets/Publications/Files/coastal-hazards-guide-final.pdf>; Storey, B., Owen, S., Noy, I. & Zammit, C. (2020). *Insurance Retreat: Sea level rise and the withdrawal of residential insurance in Aotearoa New Zealand*. Report for the Deep South National Science Challenge, December 2020; Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington; Willis, G. (2014). *Managing natural hazard risk in New Zealand - toward more resilient communities*, a report for LGNZ.; Newman, R., Nicholls, K., & Adams-Kane, J. (2022). *Residential mortgage exposure to flooding risks*. Retrieved [www.rbnz.govt.nz](http://www.rbnz.govt.nz)



# The evolving scale of the challenge

## Climate change impacts and our current funding approach are exacerbating our risks.

Flooding poses very significant risks to lives, livelihoods, communities and the economy, as we continue to see with every major flooding event. However, there are three main indicators that the situation is about to become worse.

First and foremost, existing flood protection schemes require ongoing maintenance and repair, with many needing major upgrades in order to continue functioning as intended. This does not include the implementation of new schemes and initiatives to meet current and future needs.

However, flood protection schemes are primarily funded through an already stretched-thin ratepayer base, and increasing rates to fund this necessary work is neither viable nor equitable. In the absence of any central government funding, the affordability and continuity of flood protection schemes – so crucial to protecting our nation's assets – remains under threat.

Second, the assets protected by these schemes have steadily increased in value over time. Adjacent urban development has also intensified. This means that the damage from a major flood event will incur significant wellbeing and economic costs, which are rising over time. Traditionally some of these costs have been recouped via insurance, although pay-outs do not cover the full extent of damage nor do they reduce the future risk of flooding.

Third, and relatedly, the impacts of climate change are creating further risks to our flood resilience. Both NIWA and international evidence indicates an increased frequency and severity of extreme flood events, alongside rising sea levels which pose threats to coastal communities. Increasing flood events lead to successive increases

in insurance premiums as well as the partial or full withdrawal of cover by insurance companies, as already seen in parts of the United States.

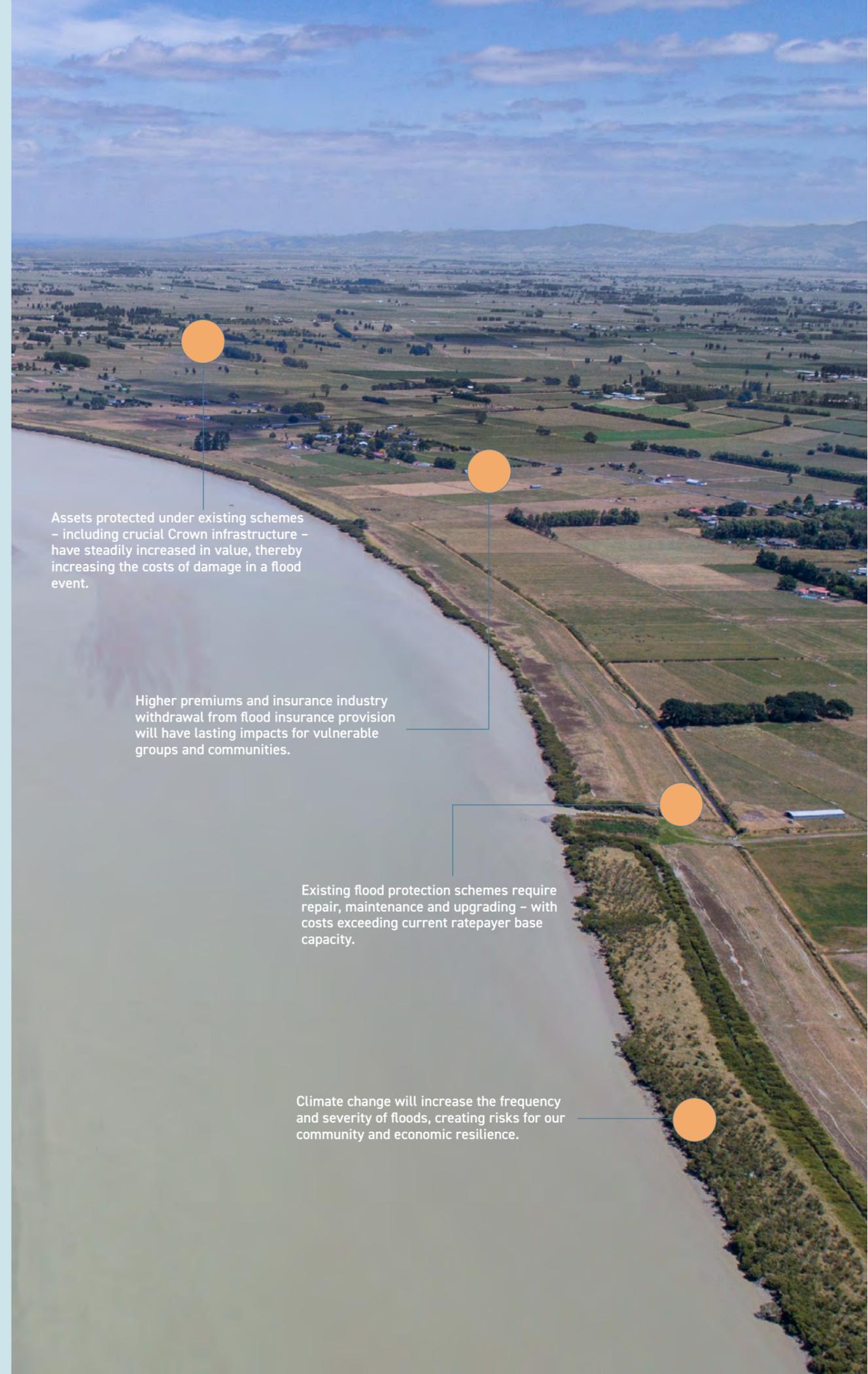
Indeed, recent research has conservatively estimated that New Zealand will see very significant insurance premium hikes within the next ten years, with more than 10,000 houses across Wellington, Auckland, Christchurch, and Dunedin experiencing full insurance withdrawal by 2050. While the Insurance Council of New Zealand has previously signalled their own commitment toward maintaining insurance support for high risk communities, this is contingent on broader national-level commitments toward flood risk mitigation.

Higher insurance premiums and retreat will create lasting impacts for vulnerable communities who will be unable to rebuild nor have the means to relocate after a flood. This is just one way climate change will disproportionately be felt those most vulnerable in society, with enduring impacts on intergenerational wellbeing.

Flooding also represents a significant liability for the government, with the projected costs of climate change on storms and flood liability alone is conservatively estimated to increase Crown liability to between \$231 and \$261 million per year by 2050.

Together, these lines of evidence suggest materially increased risks to Aotearoa's wellbeing and economy in coming years. Mitigating these foreseeable risks through central government co-investment will serve as the nation's first line of defence against climate change-induced flooding, with benefits for every New Zealander.

Sources: NZIER (2020). *Investment in natural hazards mitigation: Forecasts and findings about mitigation investment*. Report to DIA; Storey, B., Owen, S., Noy, I. & Zammit, C. (2020). *Insurance Retreat: Sea level rise and the withdrawal of residential insurance in Aotearoa New Zealand*. Report for the Deep South National Science Challenge, December 2020.



Assets protected under existing schemes – including crucial Crown infrastructure – have steadily increased in value, thereby increasing the costs of damage in a flood event.

Higher premiums and insurance industry withdrawal from flood insurance provision will have lasting impacts for vulnerable groups and communities.

Existing flood protection schemes require repair, maintenance and upgrading – with costs exceeding current ratepayer base capacity.

Climate change will increase the frequency and severity of floods, creating risks for our community and economic resilience.

# There are strategic risks in our current approach

## The business as usual approach to flood protection is creating significant strategic risk for the Crown.

**Climate change will increase our flood risk of flood events, and if left unmitigated this will lead to partial or full insurance retreat.**

### Climate change increases flood risk and insurance retreat

Climate change has been identified as a threat to the re/insurance industry as early as 1979. The issue impacts insurance markets in two ways.

First, extreme weather events are increasing our underlying flood risk meaning insurance companies are also increasingly taking on a greater risk, along with potentially bigger financial losses. This requires a greater reliance on reinsurance to remain solvent.

Second, it means that flooding is no longer an unforeseeable or chance event, but is becoming an increasing reality for many regions. Indeed, the Insurance Council of New Zealand (ICNZ) notes that certain impacts of climate change such as sea level rise are neither unforeseen nor insurable.

As a result, insurers are more attuned to climate change in their actuarial analysis and pricing. Using sophisticated catastrophe and disaster modelling tools, insurers are now shifting toward risk-based pricing where individual flood risk ratings determine premiums.

In some cases, the level of flood risk may be too high or unprofitable for re/insurers to underwrite,

making insurance unaffordable and/or restricted in certain regions (partial retreat) or creating 'no go' zones where insurance companies fully retreat from providing coverage.

Previous evidence suggests partial insurance retreat occurs when flood probabilities exceed the 2% Annual Exceedance Probability (AEP) threshold, and full retreat by 5%. In fact, we are already seeing insurance retreat play out in flood-prone areas such as Florida and Louisiana, in the United States.

### The state of play in Aotearoa

According to a 2018 Lloyd's of London report, New Zealand is the second riskiest country, after Bangladesh, in terms of expected losses from natural disasters (as a proportion of GDP). We also have one of the highest levels of insurance penetration in the world - between 96 to 98% of homes being insured - with flood risk cross-subsidised over a wide base.

However, in late 2021 Tower Insurance shifted toward an individual risk based system for flood protection with approximately 10% of its customer base seeing an increase in premiums. Based on early indications we can expect the local insurance market to follow suit, especially

since most insurance companies in Aotearoa are internationally based.

Other companies such as IAG have also signalled the impending impact of climate change on risk, while calling for urgent collaborative flood risk prevention and reduction.

These changes are likely to have implications for insurance availability and affordability, and central government is already considering options for home flood insurance as outlined in the National Adaptation Plan.

The ICNZ has also set out its views on the need for an urgent, proactive, and coordinated approach to flood risk mitigation and adaptation in Aotearoa. They have emphasised that the time for acting is now, while insurance is still largely accessible across the country, rather than relying on affordability issues as the trigger for action.

More recently IAG has echoed these sentiments and put forward a three-step plan for flood risk reduction, including:

- (1) improved mapping of flood prone locations;
- (2) implementing national policy to stop development in flood prone locations; and

(3) developing a business case for a national programme of investment in flood protection based on priority locations identified in step 1.

Thus, there is growing impetus from the insurance industry for more proactive risk reduction and adaptation in the lead up to its eventual shift toward risk-based pricing, alongside consistent signalling that the industry is committed to being part of the solution.

Sources: Bajrektarevic, A., & Baumer, C. (2012). *Climate change and reinsurance: The human security issue*. Economics, Management & Financial Markets, 7(4), 42-86; Surminski, S. (2017). *Fit for the future? The reform of flood insurance in Ireland: resolving the data controversy and supporting climate change adaptation*. Policy paper, The Grantham Research Institute on Climate Change and the Environment; Storey, B., Owen, S., Noy, I. & Zammit, C. (2020). *Insurance Retreat: Sea level rise and the withdrawal of residential insurance in Aotearoa New Zealand*. Report for the Deep South National Science Challenge, December 2020; Lloyd's of London. (2018). *A world at risk: Closing the insurance gap*; Ministry for the Environment. 2022. *Aotearoa New Zealand's first national adaptation plan*. Wellington.; ICNZ. (2022). *ICNZ submission on the draft National Adaptation Plan including managed retreat*. Retrieved [www.icnz.org.nz](http://www.icnz.org.nz).

# How the insurance of flood risk works

**Insurance minimises the potential negative impacts of an event, but does not reduce the risk of the event itself.**

Insurance is about risk management based on the probability of these risks and their likely negative consequences occurring.

As illustrated in the figure at right, insurers take on accepted levels of risk - calculated through risk modelling - on behalf of individuals or businesses, in exchange for a premium. Policy holders receive financial compensation should the risk eventuate, thereby limiting its negative impacts but not the risk itself.

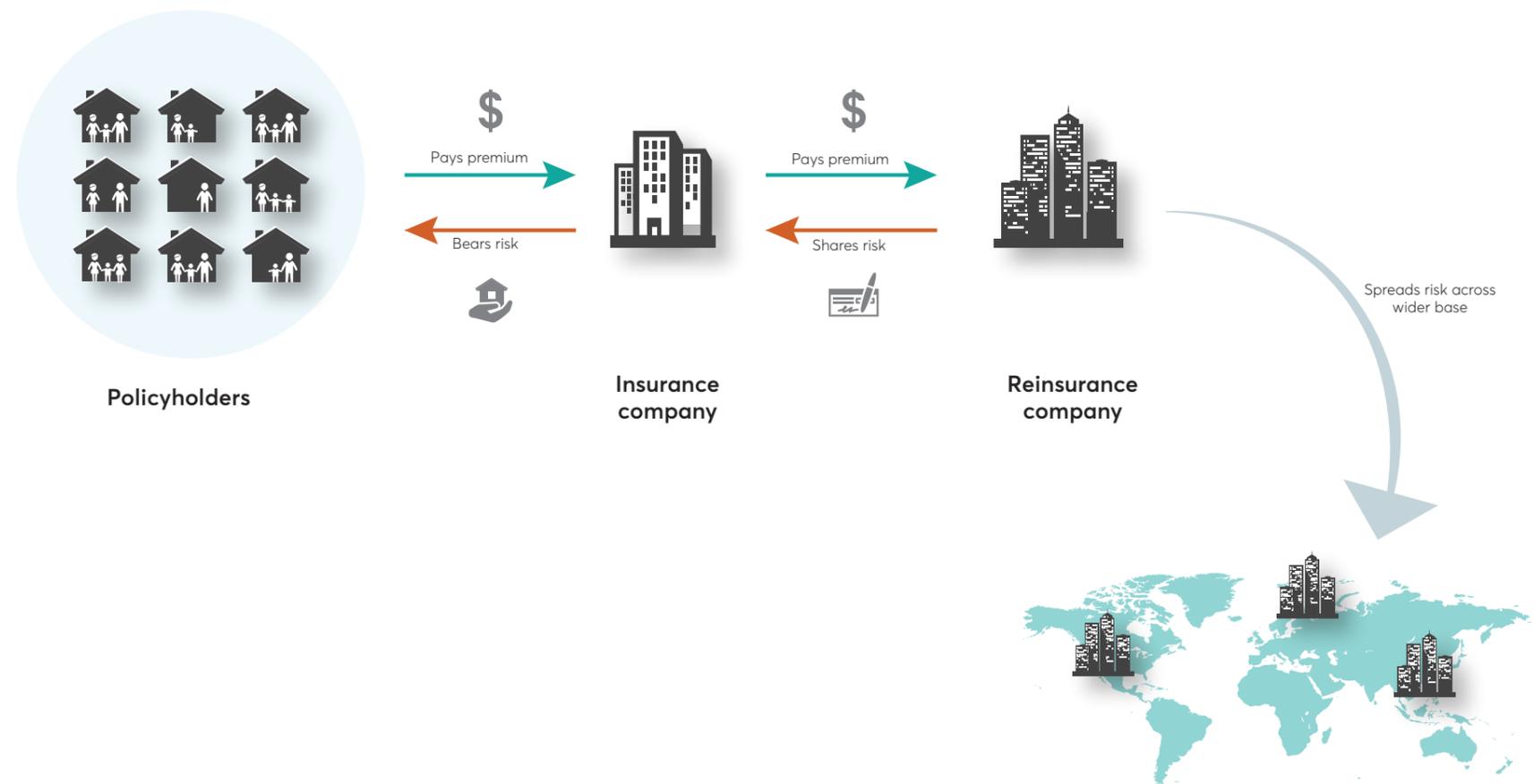
Since most risks are independent and affect only a small number of policy holders at any given time, insurance companies remain profitable by calculating premiums in a way that spreads risk across the group of policy holders.

However, in the case of natural disasters that affect large populations and require payouts en-masse, there is a high loss potential for insurance companies. Reinsurance then becomes critical in managing these risks.

Reinsurance allows another entity (the re-insurer) to take on a proportion of an insurance company's risk coverage in exchange for part of the insurance premium. Put simply, reinsurance is insurance of the insurers. This enables insurance companies to reduce their exposure to loss by spreading the risk amongst a wider pool globally.

Accurate assessment of flood risk and calculation of premiums through actuarial analysis is therefore crucial to the business of re/insurance.

From a flood risk perspective, insurance therefore represents a market-based approach to disaster management wherein risk is transferred from the public sector to the private insurance industry.



Source: Bajrektarevic, A., & Baumer, C. (2012). *Climate change and reinsurance: The human security issue*. *Economics, Management & Financial Markets*, 7(4), 42-86

# The role of insurance in disaster (flood) risk

The success of flood insurance depends on how well flood risk itself is managed.

## Where insurance can be helpful

Insurance transfers fiscal risk to another entity; allowing policyholders to recoup some - but not necessarily all - the costs of damage. Other social, cultural, and environmental costs may be both unquantifiable and excluded from cover.

In theory insurance can provide a degree of flood resilience by: (1) enabling households and communities to rebuild after a major flood, and (2) providing price signals and financial incentives for risk reduction prior to flood events occurring.

However, these benefits can only be fully realised when insurance is embedded in broader risk management efforts supported by government and other key stakeholders.

## Where insurance can be detrimental

When the costs of flooding falls primarily to insurance companies, insurance can create a false sense of security and become a moral hazard that disincentivises risk reduction efforts. It can also create perverse incentives by encouraging development and living in flood-prone regions.

This will essentially 'lock in' maladaptive patterns, making adaptation and managed retreat difficult in the long-term. Thus, the short-term benefits of insurance can ultimately increase and cement our vulnerability to flood risk in the long term.

What's more, in the case of partial or full insurance retreat government intervention will be required to ensure affordability and access to flood protection.

## Example of state intervention: the NFIP

State intervention overseas has typically been in the form of publicly-funded flood insurance schemes, such as the National Flood Insurance Program (NFIP) in the US.

The NFIP was established in 1968 and is managed by the Federal Emergency Management Agency (FEMA). Its main purpose is to offer flood insurance to high flood risk properties, as well as assess and manage flood risk through floodplain management standards. Communities can access federal flood insurance on an opt-in basis if they comply with the established minimum standards.

This scheme offers valuable insights on the pitfalls of state intervention in natural hazard insurance.

- In the absence of effective flood risk mitigation systems, the program has been critiqued for repeatedly subsidising ill-advised development in flood-prone regions.
- The data and flood maps used are also outdated and do not account for the impacts of climate change on flood risk, nor is this information necessarily made transparent for buyers and renters.
- In the face of growing flood risk, the program's move to an individual-based risk assessment system in 2021 was received unfavourably. This shift saw premiums increase for around 77% of customers, often at steep rates.
- Underwriting flood insurance also creates

further liability at the state and federal level. In Florida, for example, the state-backed insurance company Citizens Property Insurance Corp. has been forced to underwrite more than 1,000,000 policies due to private insurers pulling out of the market.

- As of June 2022, the NFIP is also more than \$20.5 billion in debt. This cost of debt as well as the rising cost of insurance will be passed on to residents and businesses through increased hurricane taxes.

Overall then, providing affordable insurance - through government subsidisation or underwriting - without addressing the underlying risk only creates further harm. Such schemes also significantly raise government liability and debt.

Publicly funded insurance can also create an expectation for government intervention in all hazards - including those related to climate change - which may not in fact be insurable.

## The case for minimising flood risk

In short, insurance alone - whether private or publicly-funded - cannot be the only intervention in managing our flood risk. The ICNZ has also previously noted their support for "maintaining the affordability and availability of insurance [only if] there is a proactive focus on controlling, avoiding, and accepting some level of residual risk in the face of climate change."

Indeed, when compared to other hazards such as earthquakes, there is a strong argument for shifting away from a reliance on flood insurance

as risk transfer since flood risk is more amenable to adaptation and mitigation measures. The success of flood insurance therefore depends on how well flood risk itself is managed.

Sources: Congressional Research Service. Available at [sgp.fas.org/crs/](http://sgp.fas.org/crs/); Surminski, S. (2018). *Fit for purpose and fit for the future? An evaluation of the UK's new flood reinsurance pool*. Risk Management and Insurance Review, 21(1), 33-72.; ICNZ. (2022). *ICNZ submission on the draft National Adaptation Plan including managed retreat*. Retrieved [www.icnz.org.nz](http://www.icnz.org.nz).

# The risks of insurance retreat

Insurance retreat will have a wide range of impacts on homeowners, businesses, our communities, and our economy.

Without central government co-investment and a collaborative approach to flood risk mitigation, Aotearoa will experience a partial or full insurance retreat in the near future.

Insurance retreat will have a range of negative impacts for homeowners, businesses, local communities, central government, and the wider economy. These impacts are illustrated in the risk bowtie diagram, with the causal factors to the left in blue and the potential consequences to the right in orange.

Thus, there is significant economic risk if we continue on the current trajectory.

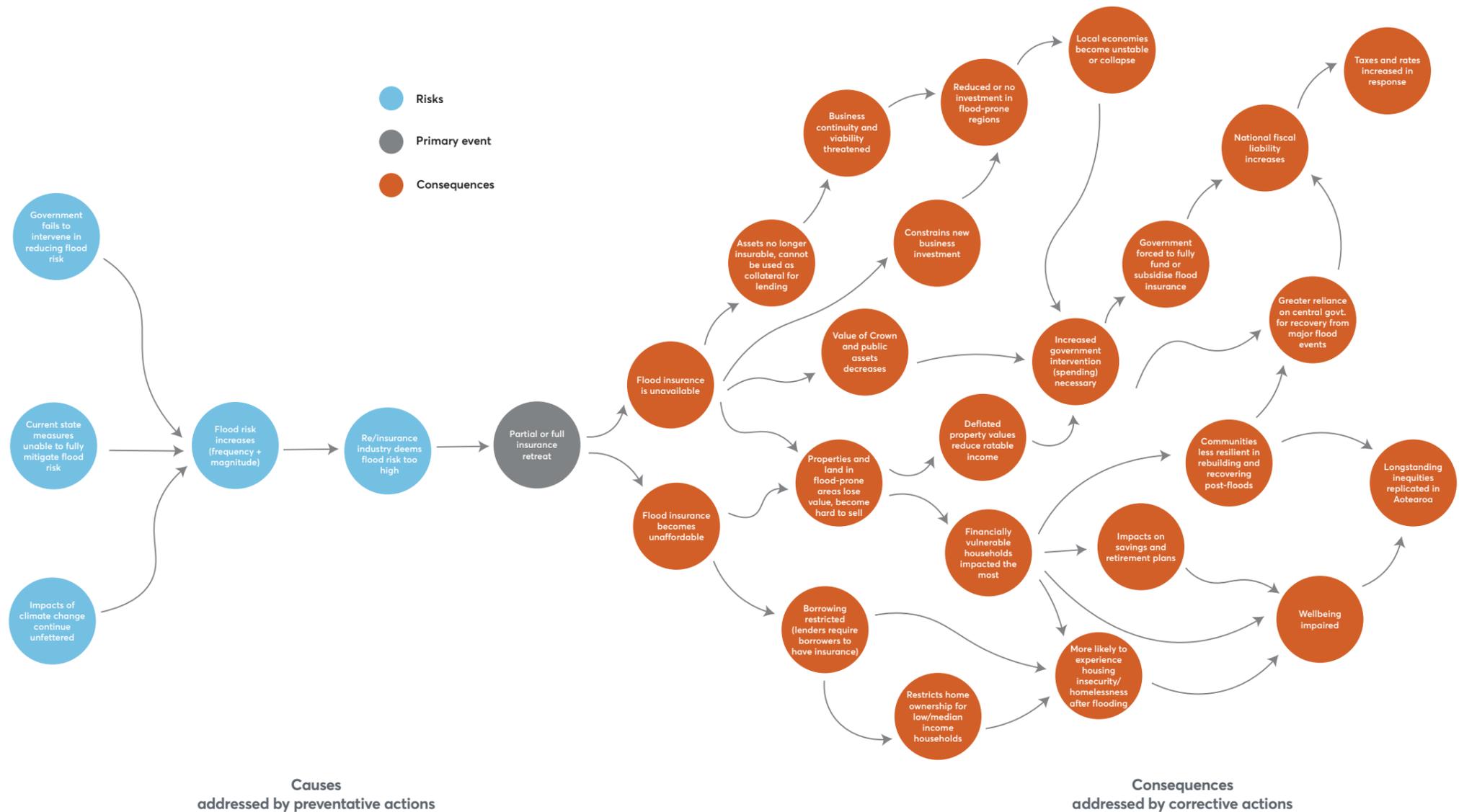




Image: Flooded orchard in Motueka, Tasman region

# Exacerbating our flooding risks

**In the midst of resource management reforms, we must ensure that we are not encouraging people to live in harm's way.**

In tandem with our over-reliance on risk transfer through insurance, there is also the issue of new developments being permitted in high risk regions; i.e., those most threatened by climate change and/or flood risk.

Resource management policy is currently undergoing reforms with regulation around land use and development likely being covered by the new Strategic Planning and the Natural and Built Environments Acts. However, these laws are not set to come into play for another few years.

In fact, Minister of Climate Change James Shaw has previously indicated urgent environmental regulation can be difficult due to the slow pace of policy and legislation.

In the interim permitting risky development locks in maladaptive patterns that are likely to create further harm for communities in the long term. Establishing new developments will also limit future options for flood adaptation, including making managed retreat much more challenging.

With the reforms currently undergoing a transitional period, we are operating in a regulatory gap. The insurance industry, through ICNZ, have advocated for halting development in high-risk areas, with IAG echoing this as part of their three step plan. There is also growing public concern around this issue.

Failure to act will not only increase future flood risk and put more people in harm's way, but will also lead to loss in public trust and confidence. This will also inevitably result in increased taxes to fund future flood response and flood risk management over time.

Local Government has previously noted a similar stance, with LGNZ chief executive Susan Freeman-Greene arguing that "we need strong short- to medium-term measures backed by longer-term solutions as part of the resource management reform."

Thus there is significant political risk in continuing to permit investment in at-risk regions, requiring urgent action in the short- and medium-term.

Sources: Daalder, M. (2022). *Slow lawmaking leaves gap for risky development*. Retrieved <https://www.newsroom.co.nz/slow-lawmaking-leaves-gap-for-risky-development>; ICNZ. (2022). *ICNZ's views on climate change and the role of local government*. Retrieved [www.icnz.org.nz](http://www.icnz.org.nz)

# There are shortfalls in our national response

There is a gap between what's needed and what's currently being done.

**The traditional ways of funding flood protection are proving inadequate in a changing world.**

## **The financial gap**

Flood protection schemes remain our nation's first line of defence against major flood events, providing billions of dollars in benefits.

Some of these flood protection assets date back to the 1900s, with most being constructed up to half a century ago. Due to a combination of assets ageing and climate change-induced flooding becoming more frequent and intense, many existing schemes are increasingly unable to cope with extreme flooding events.

Significant maintenance, upgrade, and construction works are required in order for our flood protection and mitigation systems to meet future 'acceptable' levels of risk accelerated by climate change.

Regional council river engineers have calculated the overall cost of undertaking these works is likely to be in the range of \$350 million per year. However, Regional Council Long Term Plans (2018-2028) account for a necessary capital and operating expenditure of \$200 million annually, resulting in an shortfall of \$150 million per year.

## **Why the current approach is not sustainable or equitable**

The current funding approach would see this shortfall transferred to ratepayers through an increase in targeted and regional rates. However, there are at two key reasons why this is not viable.

First, these costs exceed the reasonable capacity of

ratepayers to meet on their own, especially as flood risk continues to increase due to climate change and given rapidly rising construction costs. With rising living costs many households are struggling to pay current rates, let alone cope with an increase to sustain existing assets, and fund upgrades and new infrastructure.

This is particularly true of those regions and communities where high levels of socioeconomic deprivation intersect with flood risk. Anecdotal evidence from Westport highlights the struggles of low-income households, with many paying their rates at \$5 per pay simply because they cannot afford to pay more than that.

Second, it is inherently unfair and inequitable for ratepayers to continue to fund the protection of high value Crown-owned and related assets, as has been the case for the past three decades. Flood schemes also enable communities and economies to continue functioning during major flood events, indirectly benefiting central government and the nation.

Where central government funding is received, this is largely directed toward response and recovery post-disaster; arguably an ineffective use of public spending, and one that increases Crown liability long term.

It is therefore evident that current arrangements to funding flood protection – established more than thirty years ago – are neither equitable nor sustainable to address present and emerging needs on their own.

There have been several bids to get central government

co-investment contributions, beginning with a business case in 2019. This proposal had some impact on a July 2020 Cabinet paper that recognised the need for the current approach to evolve to meet existing and future challenges, and the need for greater central government involvement. However, it was subsequently noted that central government resources toward progressing this work would be suspended due to budget constraints in 2021. In the meantime, floods and other natural hazards have not been 'on pause'.

## **Central government needs to return to the table as co-investor**

Aotearoa is running out of time. Climate change is at our doorstep and the risks and impacts of flooding for communities and the nation are greater than ever. Significant additional investment is required to deliver healthy catchments and resilient communities.

As identified in the aforementioned Cabinet paper, central government needs to return to the table as a co-investor, fulfilling its obligations to protect and improve community resilience against floods.

The time to act is now. Doing nothing is no longer a viable option.

Source: Cabinet paper. (2020). *Improving resilience to flood risk and supporting the COVID-19 recovery.*



There is an opportunity for central government to increase its stewardship of the overall system. This implies a more active role in supporting communities and local government to manage the risks. This is particularly the case where some functions are best performed or coordinated at a national level or where it is beyond the capability of local government and communities to manage effectively at local or regional levels.

- Cabinet Paper, 1 July 2020

# The co-investment approach

Regional councils have demonstrated capability and capacity to deliver flood protection infrastructure.

**Our co-investment proposal will enable essential infrastructure work to progress in some of our most vulnerable communities.**

In 2021, Kānoa invested \$217 million into 55 flood protection projects across Aotearoa as part of the government's COVID-19 recovery programme. This investment represents the most significant contribution from central government in over 30 years and has fast-tracked projects to improve long-term community flood resilience.

Regional councils prioritised 'shovel ready' projects that would accelerate existing or planned programmes of work for flood risk management. Kānoa and central government priorities for these projects were around climate resilience, with social procurement as an implementation requirement.

This funding was considered the first step in an establishing an effective ongoing co-investment partnership for flood resilience between central and local government.

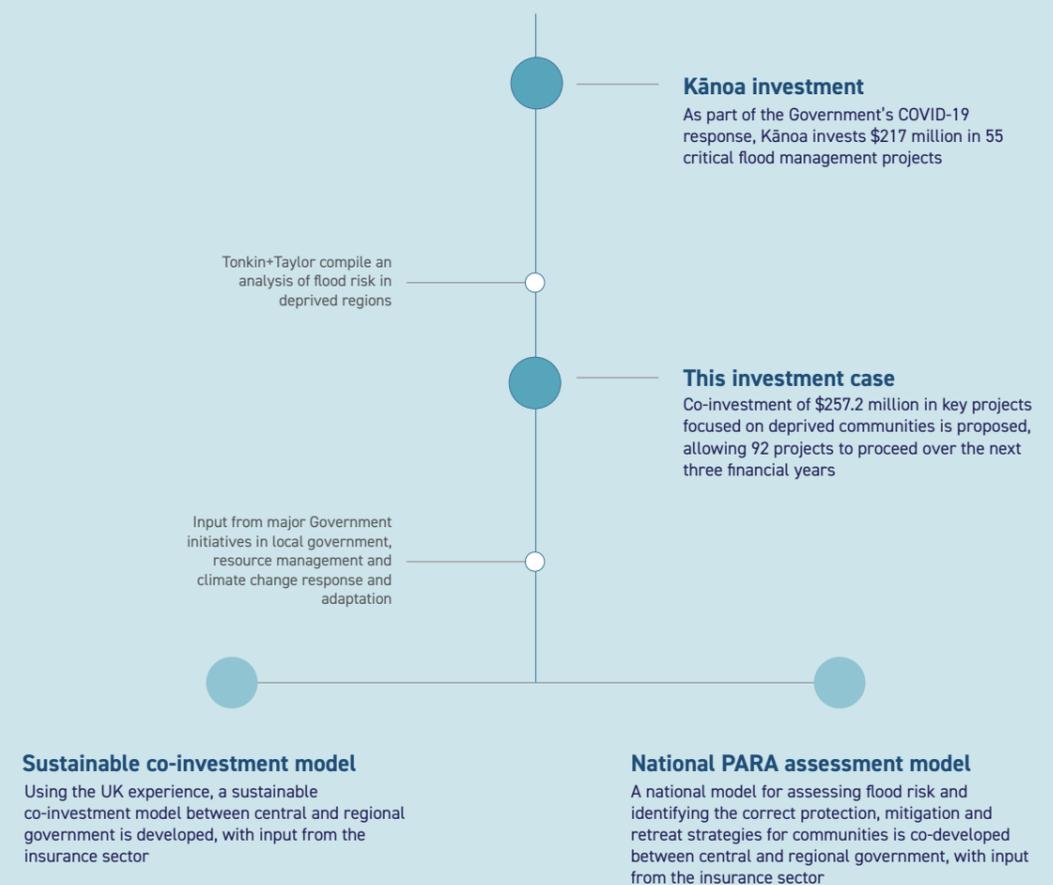
The midway progress report (included overleaf) evidences councils' capability and track record of delivery on projects funded through central government contributions. A selection of case studies also follow, demonstrating the wide range of social, economic, cultural, and environmental benefits arising from this investment.

The sector's delivery and execution of these 55 essential flood protection projects provides an important foundation for co-investment and developing genuine partnership with central government in improving community flood resilience and wellbeing outcomes.

Within this context, our request for co-investment of \$257.2 million over three years represents the continuation of essential infrastructure work, allowing some of our most vulnerable communities to progress shovel-ready flood protection projects.

Central government has and continues to demonstrate a significant interest in improving our flood resilience in the face of climate change; as seen in the 2020 Cabinet Paper, the National Adaptation Plan 2022-2028, and the Resource Management Act reforms. This interest is also increasingly reflected in our communities' needs and expectations.

Two additional elements are required to ensure Aotearoa has a robust approach to flood protection that will respond effectively to the challenges of climate change. These are a sustainable co-investment model that brings together central and regional government, and a national PARA assessment model that enables informed decisions to be made about protection, mitigation and retreat on a community-by-community basis across Aotearoa. These elements are discussed later in our investment case.



# Climate Resilience & Flood Protection Programme

## PROGRESS REPORT

Our regions are proud to work shoulder-to-shoulder with Kānoa in adapting our communities to meet climate change challenges.

With these challenges come more extreme weather events and flooding. The impact of flooding is often devastating to our communities and our local economies, affecting critical road, rail, air and built infrastructure, productive agricultural land, as well as the lives and livelihoods of our whānau.

At this mid-way point of the Climate Resilience programme, we are pleased to reflect on the progress made thus far and to see the co-investment we have made into these 55 projects has resulted in the acceleration, or in some cases, has enabled altogether, these critical flood protection works which together provide resilience to our many river communities.

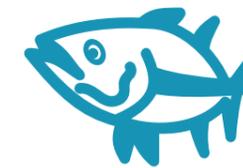
**\$312M** HAS BEEN CO-INVESTED BY KĀNOA AND OUR REGIONAL AND UNITARY COUNCILS INTO **55 PROJECTS** ACROSS AOTEAROA



## Programme Achievements

catchments with protected fish-safe pathways created

**5,297 ha\***



wetlands created or enhanced

**835 ha\***

community resilience across

**8,642 ha\***

the equivalent land area of more than 10 Kaitiāia's



**653\***

local jobs created



**\$50.0m**

estimated flood damages saved in Kaitiāia alone

Kānoa distributed funds\*\*\*

**\$107.03m**



**\$90.0m**

of Kānoa funds spent\*\*\*

**\$47.1m**

council funding/co-investment spent\*\*\*

local business contract value

**\$117,184,773\*\***

māori business contract value

**\$8,429,984\*\***

other business contract value

**\$11,864,865\*\***

\* BASED ON PROJECTIONS ACROSS ALL PROJECTS TO COMPLETION \*\* AS OF AUGUST 2022 \*\*\*AS AT END-SEPT 2022.

WAIMAKARIRI RIVER, CANTERBURY - McIntoshs bend Flood Protection



Resilient River Communities



Regional and Unitary Councils Aotearoa



Kānoa Regional Economic Development & Investment Unit

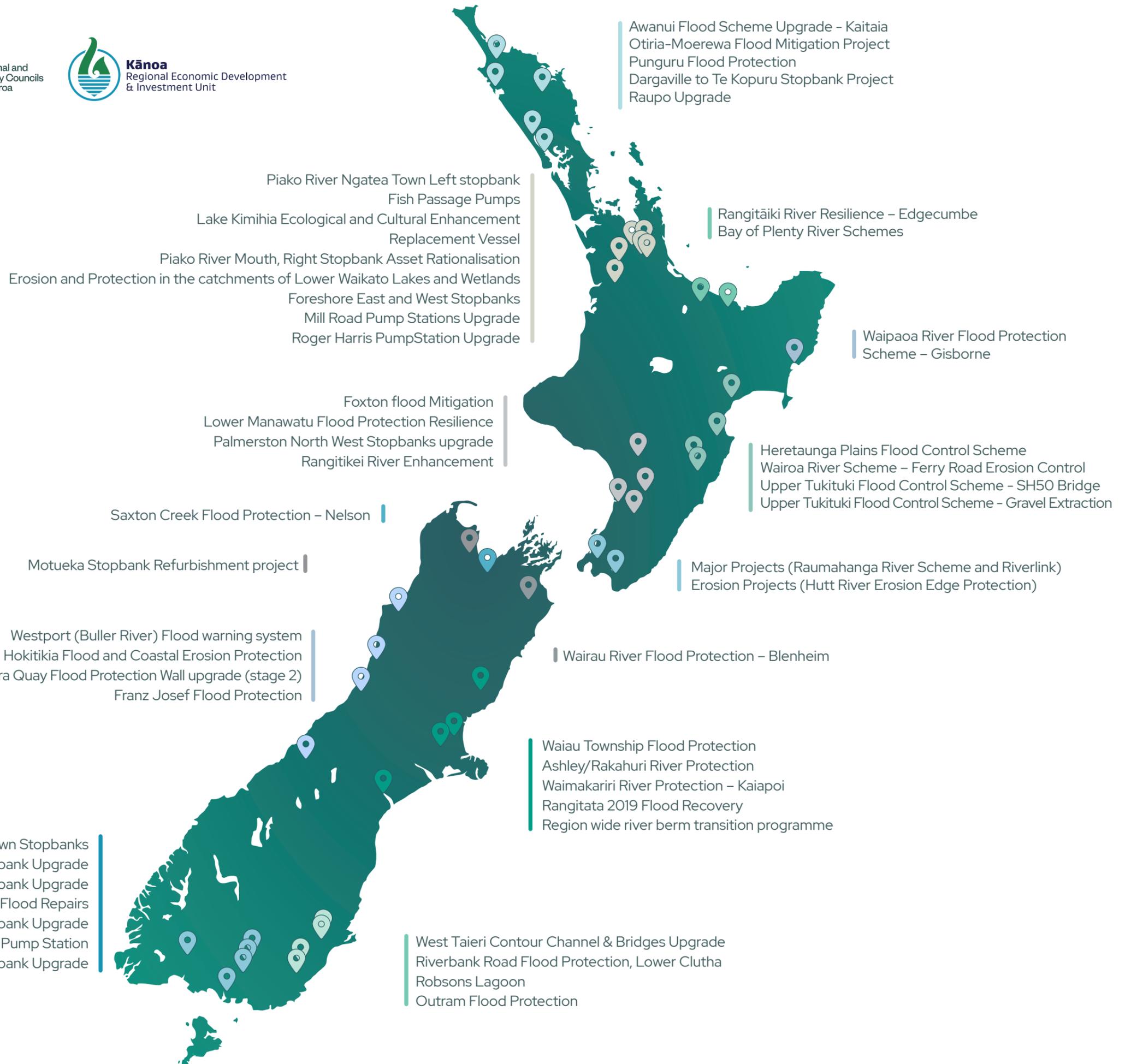
# \$312M

## Total Projects 55



Minister Stuart Nash and Councillor Chad Tareha officially open stopbank work with a sod turning and karakia along Tūtaekuri in Taradale Napier.

Left to right: Napier City Councillor Chad Tareha, Minister Stuart Nash, Regional Councillor and Chair Hinewai Ormsby, Te Kaha Hawaikirangi, James Palmer



# COMMUNITY PROTECTION ALSO RESTORING TE MANA O TE WAI

## NORTHLAND REGIONAL COUNCIL

Otiria Spillway works will reduce flooding to Otiria and Moerewa by restoring the natural river flow path previously cut off by roads and rail.

### The challenge

The communities of Moerewa and Otiria have suffered three major flooding events in the last decade. Local housing, Otiria Marae and Te Rito Marae, the local Otiria Rugby Club, a retirement village and both towns have been at risk.

### The programme

Lower Spillway works: \$400,000  
Feb - Apr 2022

Construction of 60 metre-long bridge: \$3,900,000  
Jan 2023 to Dec 2023

Upper spillway and stopbank: \$700,000  
Dec 2022 to Dec 2023

### Iwi partnership

- Working together - tangata whenua and local government agreeing solutions.
- Sharing kai, meeting in local venues, participating in tikanga.
- Karakia / blessing led by tangata whenua.
- Cultural induction - contractors to local whānau / hapū.

### Restoring Te Mana o Te Wai

- Spillway to skim flood flow from Otiria Stream and restore the natural flow that has been blocked by roads and railroads.
- Replacing existing bridge with a new bridge to handle a 1:100 year and climate change flood event.

### Local input and engagement

- Local knowledge integrated into project plan.
- 10 community roopu engaged and participating.

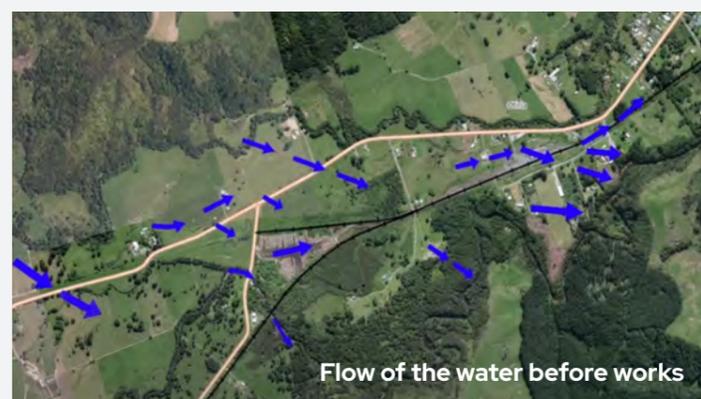
### Collaboration

Successful collaboration between:

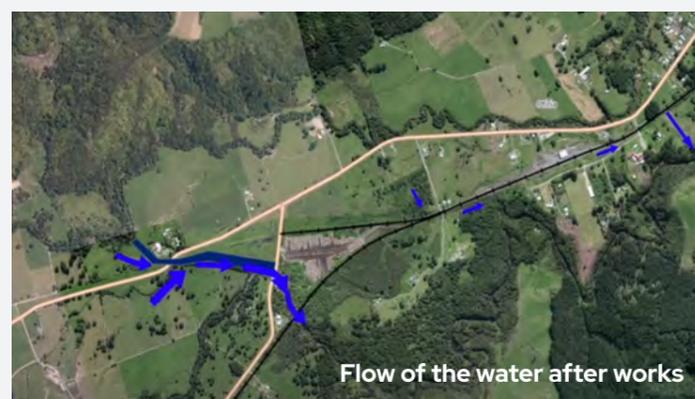
Tangata whenua, landowners, Kaitiaki, Willow Jean Prime, NRC Project Team, Councillors, Far North District Council, Haigh Workman Engineers, KiwiRail, KCL - Stage 1 contractors.

### Project funding

Kānoa \$2.8m | NRC \$2.2m | Total \$5m



Flow of the water before works



Flow of the water after works

## OTIRIA SPILLWAY

Location: Otiria, Moerewa, Northland

### Key Benefits

- ✓ **Protection:** reducing risk to flood-prone marae, local rugby club, local housing.
- ✓ **Reducing risk:** reducing severity of a typical flood by ~75%.
- ✓ **Collaboration:** collaborative and iwi partnership approach to mahi.
- ✓ **Social benefits:** employing local rangatahi, whānau/hapū.
- ✓ **Whakawhanaungatanga:** establishing relationships - council, whānau/hapū, contractors, wider community.
- ✓ **Cultural assessment:** taonga species monitored at local event with NRC freshwater scientists and whānau/hapū.
- ✓ **Events:** rubbish day, cultural assessment, diverse attendance at cultural induction days.
- ✓ **Education:** kaitiakitanga training, learning what makes the awa thrive, monitoring.
- ✓ **Enabling affordability:** many communities cannot absorb increased cost of rates to pay for new or upgraded flood protection schemes. Contribution by central government has enabled increased resilience to climate changes and protection against flooding.



the project has... "shown us what a true partnership looks like from a hapū mana whenua point of view when referring to Te Wakaputanga 1835 & Te Tiriti o Waitangi 1840."

- Local kaitiaki  
Wiremu Keretene



Regional and Unitary Councils Aotearoa



Kānoa Regional Economic Development & Investment Unit

# FLOOD PROTECTION ACROSS ALL OF GISBORNE

**GISBORNE DISTRICT COUNCIL**

## The challenge

Climate change is the most significant long-term issue facing the Gisborne region. In 2020 the government declared a climate change emergency, recognising the need for preparation for the impacts of a warming climate with more erosion, more flash floods and wildfires likely in the Gisborne region. Impacts include expecting sea level rise, coastal erosion and floods affecting homes and recreation.

Flood protection keeps Gisborne's people and community safe from its rivers breaking their banks in heavy rains and ensures that its important horticulture, viticulture and farming assets are protected from the effects of climate change.

## Project summary

- Long term climate change resilience programme.
- Approx 64km of stopbanks being widened and heightened along the Waipaoa River.
- Work began in 2019 and is scheduled for completion in 2030/31.
- Some 10,000ha of fertile floodplain land and Gisborne City will be protected by this mahi.
- The Waipaoa Flood Control Scheme is deemed one of the council's most valuable assets.

## The programme

### Completed work

- **February 2019 to March 2022:** 19.6km stopbank construction.
- **March 2022:** 1km further stopbank construction and sheet piling for construction of the Spillway at Wi Pere Trust begins.
- **April 2022:** 3km further stopbank construction Whitmore Road and Kaitaratahi Hill.

### Current and future work

- **September 2022 – January 2023:** complete flood mitigation work on Wi Pere Trust land at 864 – Lavenham Rd (western side) and further construction between Whitmore and Caesar Road – 1.2km (eastern side).
- **January 2023 – a significant milestone:** all stopbanks upgraded on eastern (city) side. 25km of stopbanks successfully upgraded.
- **September 2022 – June 2023:** construction between Waipaoa River mouth and Te Arai Stream (western side) and Te Arai Stream to just downstream of Matawhero SH2 Bridge (western side).
- **October 2023 onwards:** progressively upgrade the western side until complete – from Matawhero SH2 Bridge upstream.
- **2030/31:** Waipaoa Flood Control Scheme fully upgraded and operational on both sides.

## Project funding 2020–2023

Kānoa \$7.5m | GDC \$6m | Total \$13.5m

Planning, investigation and design is also continuing for future stopbank upgrade areas, all of which are located on the western side of the Waipaoa River.

**Funding provided by Kānoa helped to accelerate this programme of work.**

Total project likely cost 2019 – 2030/31: \$32–35 million

# WAIPAOA RIVER FLOOD CONTROL UPGRADE

**Location:** Waipaoa River, Gisborne

## Key Benefits

- ✓ **Local employment boosted:** two local contractors have combined employed 12 new staff as a direct result of this project.
- ✓ **Climate change adaptation:** increasing the level of flood protection to the Poverty Bay floodplains and Gisborne City to a 100-year return period accounting for climate changes out to the year 2090.
- ✓ **Protection:** for housing, businesses, local and state highway roads, airport, hospital, horticulture, viticulture and farming assets.
- ✓ **Safeguarding:** economic development and wellbeing.
- ✓ **Contributing to community infrastructure:** 8km long cycle trail along Waipaoa River mouth to Matawhero SH2 Bridge. Cattle stop ramps, signage and squeeze gates installed.
- ✓ **Care for the environment:** borrow sites for stopbank fill have the least environmental impact on river ecology, fish passage and spawning. Cultural and archaeological discovery protocols in place.
- ✓ **Money flowing back into the local economy:** to businesses engaged for maintenance and mechanical work, steel work, engineering, tyres, right down to the helicopter company laying grass seed.
- ✓ **Enabling affordability:** many communities cannot absorb increased cost of rates to pay for new or upgraded flood protection schemes. Contribution by central government has enabled increased resilience to climate change and protection against flooding.

# AVERTING \$50M\* DAMAGE TO KAITĀIA

\*estimated

## NORTHLAND REGIONAL COUNCIL

### The challenge

After the significant flood of 1958 (pictured below), a comprehensive upgrade to this flood protection scheme was undertaken, including the construction of stopbanks and the Whangatane Spillway enlargement. Further improvements have been required, including to meet the projected impacts of climate change.

### The programme

- 8-year programme condensed to 3 years due to Kānoa funding support.
- \$15.5m (total value) of spillways, stopbanks, floodwalls.
- Extensive improvements to stabilise stopbanks allow the river to safely carry 15% more floodwater.
- Emergency spillway greatly reduces risk to life, property.
- Protecting public safety through repairs and maintenance.

- Pictured below: collaboration with FNDC project where shared cycle/walkway was installed along the river as well as a play area and community BBQ with shade sails as part of a separate Kānoa-supported project.

### Project funding

Kānoa \$8.5m | NRC \$4.5m  
Local Community \$2.5m

### Project duration

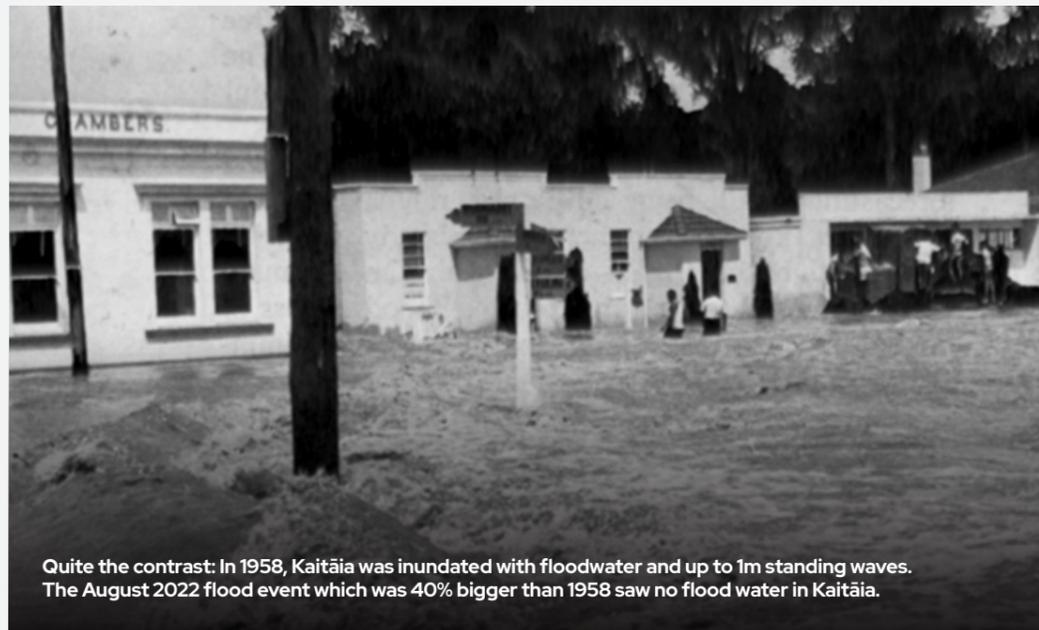
3 years

### Jobs

40

There is the potential for investment in further work to adapt to climate change in the lower reaches.

FNDC's new community BBQ area at Alan Bell Park is protected by the Awanui Scheme Upgrade. ➔



Quite the contrast: In 1958, Kaitiāia was inundated with floodwater and up to 1m standing waves. The August 2022 flood event which was 40% bigger than 1958 saw no flood water in Kaitiāia.



FNDC's new cycle and walk path adjacent to Awanui scheme works. ➔

# AWANUI SCHEME UPGRADE

Location: Kaitiāia, Northland

### Key Benefits

- ✓ **\$50m\* in damages saved:** despite not yet being completed, works have already saved an \*estimated \$50m worth of damage to Kaitiāia in a 1:100 year storm event on 18 August 2022.
- ✓ **Protection upgrade:** to urban Kaitiāia in 1:100 year flood, the surrounding area from a 1:20 year flood, to adapt to projected impacts of climate change. Before Scheme upgrade LOS 1:30 Kaitiāia and 1:10 rural.
- ✓ **Enabling affordability:** many communities cannot absorb increased cost of rates to pay for new or upgraded flood protection schemes. Contribution by central government has enabled increased resilience to climate change and protection against flooding.
- ✓ **Iwi partnership:** including planting days arranged by Oturu Marae with around 45 attendees over two days and arrangements for Oturu and Te Paatu Marae to maintain planting.
- ✓ **Council collaboration:** Northland Regional Council and Far North District Council working together, including planting collaboration and installation of community assets (part of another Kānoa-supported project). FNDC's assets include 2.2m wide shared cycle and walking loop along the awa, as well as play area and community BBQ nearby. Bench seats, outdoor exercise equipment and solar lighting also to be installed riverside, adjacent to current works - all protected by the Awanui Scheme Upgrade.
- ✓ **Community planting day:** marae-organised planting day with two local primary schools, over 45 attendees over two days and representation from Oturu, Te Paatu, Te Rarawa with NRC sponsoring trees, kai.
- ✓ **Social benefits:** employing 40 people including local rangatahi, whānau/hapū.



Resilient River Communities



Regional and Unitary Councils Aotearoa



Kānoa Regional Economic Development & Investment Unit



# The objectives of this investment

The scope of the co-investment is the continuation of essential projects over the next three years.

Significant work has been undertaken to reduce the vulnerability of communities to major flooding events. But as the Westport experience shows, more work is needed to ensure we are taking all reasonable steps to mitigate the worst impacts of climate change.

This investment case does not propose structural changes to how flood protection is planned, prioritised and funded in Aotearoa; rather, it proposes co-investment by the Crown of \$257.2 million over the next three years to continue the work commenced by Kānoa, which will reduce the likelihood and impact of major flooding events in some of our most vulnerable communities.

The scope inclusions and exclusions for this investment are therefore shown in the table at right.

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## In scope

Crown co-investment of \$257.2m in capex for 92 shovel-ready projects across 14 regional government areas

Regional Council investment of \$171m in capex alongside the Crown to deliver the 92 identified projects

The delivery of the 92 projects by the end of the 2025/26 financial year

Crown co-investment of \$1.8m in opex to co-develop the sustainable co-investment model with Te Uru Kahika by the end of the 2023/24 financial year

Crown co-investment of \$3.1m in opex to co-develop the National PARA Assessment Tool alongside Te Uru Kahika, with input from the insurance sector

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## Out of scope

Investment of \$627m by regional councils over the period to 2026 in flood management outside the 92 identified projects.



Image: Karamea River

# The benefits of improving our flood resilience

There are many fiscal and non-fiscal benefits of improving our flood risk resilience in Aotearoa.

As has been noted earlier in the document, there are significant impacts in each of the wellbeing domains from major flooding events. Conversely, avoiding and mitigating these risks carries significant benefit to the people, the place and the economy.

Benefits are realised in both financial and non-financial terms; that is, some benefits accrue in the form of monetary impact such as costs avoided, whilst others are non-monetary in nature. A good example of a non-financial benefit is improved community cohesion.

The table at right provides a high-level view of both the financial and non-financial benefits in each of the wellbeing domains. Financial benefits are marked in **bold type**. Given the complexity and extent of the flood protection programme, it is out of scope for this investment case to quantify the benefits; however, the work to do so is planned for the National PARA Assessment Tool, discussed later in the document.

## Environmental benefits

- Limits costs of damage to productive farmland and crops
- Minimises damage to riverbanks (overflow, erosion, depositing sediment), land and its value
- Reduce cost of waste disposal and debris after floods
- Limits disruption to entire ecosystems (including aquatic life and their habitats)
- Limits or minimises amount of flood-damaged waste and debris to be disposed of in landfills
- Limits contamination of drinking water and water supply for industrial/agricultural use

## Economic benefits

- Provides secure places for stable economic activity
- Limits costs of damage to buildings, houses, and personal belongings
- Limits cost of damage to key Crown assets and infrastructure
- Minimises unplanned liability for Crown
- Limits costs of emergency response and recovery
- Reduces the likelihood of insurance retreat, requiring government intervention/subsidy
- Market value of properties and assets retained or increased
- Effective use of spending in minimising risk vs responding to it
- Minimises disruption to business, healthcare services, education, economy
- Restricts insurance premium hikes and partial retreat

## Cultural benefits

In collaboration with mana whenua:

- Limits costs of damage and repair for invaluable cultural assets and sites (marae, urupā)
- Protects coastal taonga including land
- Holistic wellbeing retained or improved for Māori and non-Māori into the future
- Protects cultural identity, whakapapa, and sense of belonging for Māori

## Social benefits

- Limits the likelihood of fatalities and injuries that will impose a long-term cost on health system
- Minimises social disruption and displacement during flood events, social connection retained or improved
- Minimises psychological trauma and improves individual and community resilience
- Limits health worsening for those with co-morbidities, disabilities, or elderly
- Limits housing conditions from deteriorating (dampness, mould)
- Trust and confidence in government, authorities, institutions retained or increased

# Alignment with other strategies

## Important linkages to existing and planned legislation and initiatives.

Several policy initiatives and laws will impact flood resilience outcomes, through the PARA framework.

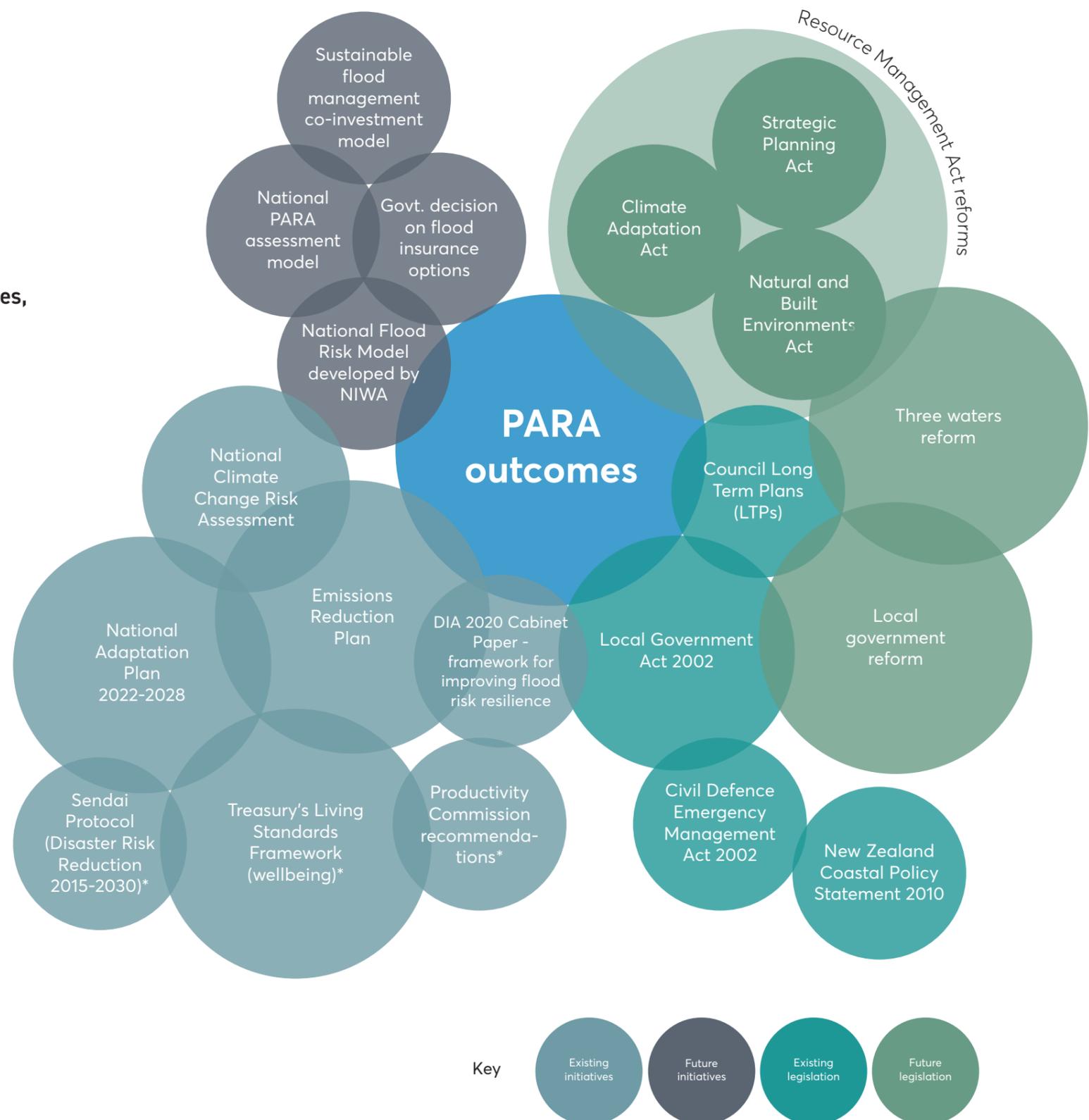
The figure at right provides an overview of the legislative and policy initiatives - both existing and upcoming - on the ability to achieve flood resilience and protection, through the PARA framework.

Proximity to the centre circle reflects a more direct means of impact, while distal initiatives and legislation are likely to have an indirect impact on achieving flood resilience.

As is evident, there is no single statute covering the management of natural hazards. Instead, there is a patchwork of legislation pertaining to flood risk management.

Most of this legislation is also enabling in nature rather than being prescriptive. While this empowers local government and authorities to act and enforce place-based solutions, the lack of a cohesive national framework guiding flood protection and management has resulted in a more pragmatic approach to flood risk management rather than organised cross-agency collaboration.

Local government and agencies are therefore currently operating in somewhat of a regulatory gap, albeit with relevant legislation and initiatives on the horizon.



# Alignment with local government reforms

**Our co-investment case is well-aligned with the shifts identified in the Review into the Future for Local Government.**

**Co-investment in flood resilience will represent a genuine and equitable partnership approach toward improving wellbeing outcomes.**

As one example of alignment with broader initiatives underway, we look to the recently released Review into the Future for Local Government draft report.

While this is an interim report released as part of the consultation process, the findings provide a valuable steer in terms of the shifts needed for local government functioning, as well as the broader context within which it operates.

Of particular relevance here is the emphasis on wellbeing, genuine partnership between central and local government, and more equitable funding. These are detailed below in relation to the case for co-investment in flood resilience.

## A focus on wellbeing

The report signals a greater focus on social, economic, cultural, and environmental wellbeing in the future of local government. It also acknowledges that while local government is well positioned to foster wellbeing, capacity and financial pressures constrain many councils' ability to deliver on these outcomes.

Floods - and climate change - can have significant long-term intergenerational impacts on the four wellbeings as well as equity. Thus, this focus on wellbeing will recognise that although local adaptation and mitigation efforts are critical in improving community flood resilience and wellbeing, local government cannot get there on their own, nor can any single central government lead agency.

## Genuine partnership

What is needed, therefore, is a genuine partnership between central and local government, along with an explicit role for Māori, in identifying shared priorities and commitments for co-investment to maximise wellbeing outcomes.

In particular, the report articulates that "successful co-investment is informed by place-based expertise and knowledge, and creates avenues for funding and strategy from central government to be deployed more effectively through input and leadership from local government and impacted communities."

Co-investing in flood resilience through a PARA approach, as proposed in this investment case, is in line with the ideals outlined in the report and will be an excellent exemplar of a coordinated and effective way of partnering to deliver on key community outcomes. Indeed, there are considerable advantages in sustaining the well-oiled delivery machine that has now been put in place.

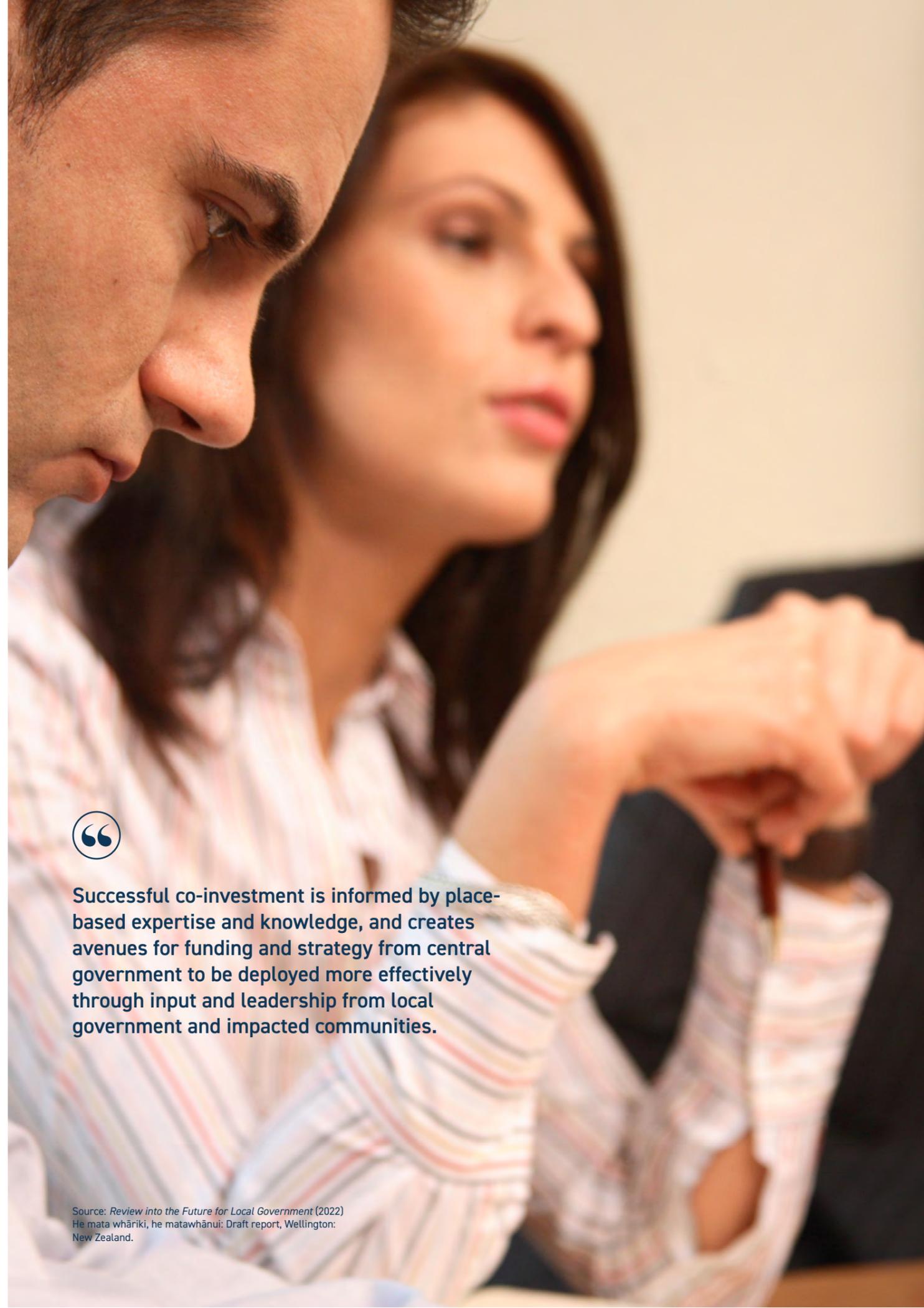
## More equitable funding

Finally, the review acknowledges the need to shift to a more sustainable funding approach - one which accounts for deprivation - in driving proactive responses to issues such as the climate change crisis. The concepts of vertical and horizontal equity discussed in the review are consistent with the outcomes envisioned in the current proposal.



**Successful co-investment is informed by place-based expertise and knowledge, and creates avenues for funding and strategy from central government to be deployed more effectively through input and leadership from local government and impacted communities.**

Source: *Review into the Future for Local Government* (2022)  
He mata whāriki, he matawhānui: Draft report, Wellington:  
New Zealand.



# Constraints and dependencies

## There are a number of constraining factors for this investment.

As noted earlier in the document, there are a significant number of other Government policy changes in train, all of which will influence how flood protection is delivered in the years ahead.

However, the need to take action is pressing; the increasing severity of the climate crisis is producing the requirement to take action sooner rather than later. The result is an interim set of projects to be delivered within the next three years, albeit with the constraints and dependencies listed at right.

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## Constraints

1. Each project represents an upgrade to a degraded or non-complying asset within a system that could potentially lead to protection failure under a design flood. Whilst options are constrained by the existing system design at this stage, future assessments will consider a wider range of options.
2. The 92 priority projects are constrained in their delivery timelines by the capacity of the construction sector within each region.
3. The timelines of some projects are constrained by consenting and consultation requirements in the context of the Local Government Act 2002.
4. While the projects will result in significant improvements in flood protection for vulnerable communities, engineering works alone are not enough to fully protect all homes and businesses from all adverse flooding events.
5. This investment will not address all flooding risks in all communities, as the focus is on the most vulnerable parts of Aotearoa.
6. Crown support for co-investment the priority projects will not result in long-term structural changes to the national funding mechanisms for flood protection, which will need to be addressed separately.
7. The priority projects are those identified by regional councils working with their communities through the development of LTPs, as there is no national approach to risk assessment and prioritisation, which will need to be addressed separately.
8. The identified projects have been prioritised as being shovel-ready and deliverable in the next three years, so some priority projects with high flooding risk have been excluded.

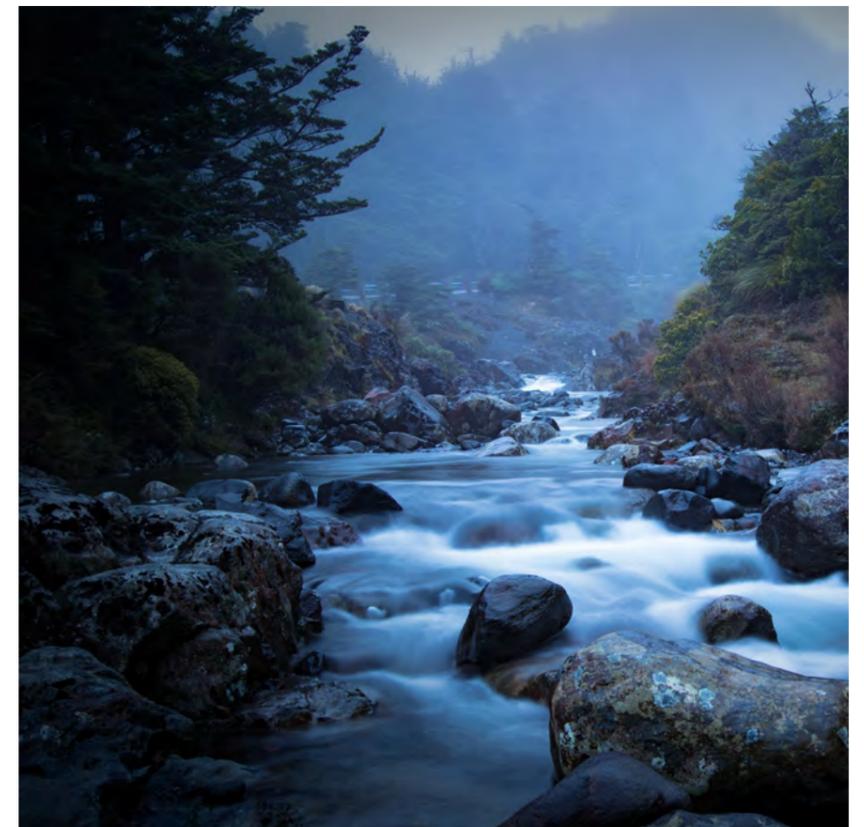
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## Dependencies

1. The investment is dependent on the commitments made in the regional council LTPs accompanying the Crown investment.
2. As noted in the assessment of strategic alignment, the flood protection interventions depend on a range of other Government policy changes, including reducing flooding exposure through planning controls and managed retreat in vulnerable areas.

# 3.0

## Economic case



# Developing the pathway forward

There are both immediate and long term issues to be addressed in our national approach to flood protection.

As the preceding section of this document shows, there are significant and structural issues in how flood protection is implemented in Aotearoa. These stem from the increased challenges of a rapidly-changing climate, coupled with a devolved funding mechanism that is reaching the limits of sustainability.

In order to address the root cause of the issues, steps must be taken to understand the scale and extent of the challenges, develop the correct policy responses and interventions, and agree a collective pathway forward. Given the nature of flood protection – affecting a huge number of communities, businesses and individuals – and the multi-dimensional threats and opportunities, this will be a complex process.

However, flood events are increasing in both frequency and severity. As the Westport and Kaitiāia examples demonstrate, action must be taken sooner rather than later if the worst impacts of major events are to be mitigated in vulnerable communities. This produces an imperative for immediate action, which is at odds with a long-term and well considered national approach.

The case for taking immediate action is irrefutable. Both national and international studies show the return on investment from well-designed flood protection works is considerable: \$1 spent protecting a community avoids \$5-\$8 in clean-up costs afterwards, before the intangible benefits – in health, social, cultural and environmental impacts – are considered.

## The immediate projects

The purpose of this proposal is by necessity limited: it makes the case for the continuation of the shovel-ready funding made available via Kānoa as part of the Government's COVID-19 recovery programme. Continuation funding allows the momentum developed over the last few years to be maintained, for more communities to be protected, and for the fiscal impacts of more frequent and severe floods to be avoided.

Te Uru Kahika has worked with all 14 regional councils to develop a roadmap for flood protection across Aotearoa, in light of the evolving challenges from climate change. Many but not all of the identified projects are at least partly funded through Long Term Plans; some projects can be commenced quickly, whilst others are only in their early assessment and design phases; some projects are in highly vulnerable communities.

A series of prioritisation criteria have then been applied to the project roadmap, which has resulted in 92 projects requiring an investment of around \$426 million, matched to a co-investment request to the Crown of \$250 million. The prioritisation framework and the results on a region-by-region basis are discussed on the following pages.

However, there is very little investment optionality in the resultant project listing. In the context of a traditional business case, a range of options would be assessed, ranging from doing nothing to aspirational approaches. In this case, the project list is largely immutable and thus the optionality is extremely limited.

## The role of optionality

Within the wider policy and intervention debates there is a very significant role for assessing and evaluating a wide range of options. These will include the scope of flood protection within the PARA framework, the roles of various agencies within the machinery of government, the various co-investment models, how governance is to be managed and much more.

These discussions will need to occur within a complex and changing policy environment, where national mitigation and adaptation strategies, the role of local government, and resource management and planning controls are all evolving. And as the previous section has highlighted, the role and intentions of the insurance sector will also be highly relevant.

In order to inform the options analysis, good data about the state of flood protection, the vulnerability of communities and the viability of different responses – from engineering works to managed retreat – will be essential. While all regional councils have elements of this data, it has yet to be integrated into a national view in a consistent way, which is preventing a joined-up view of the challenges and possibilities to be developed.

## The pathway forward

While the scope of this proposal is limited to the immediate projects – which have prioritisation choices but limited optionality – it is important to identify the pathway for developing a new national approach for flood resilience.

The diagram on the following page provides an overview of how these steps fit together, and the decisions and options at each step.

This section of the document is therefore in two parts:

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## Immediate projects

This section defines the prioritisation methodology and applies it to the current regional council projects, to arrive at a list of 92 projects with a total investment value of \$426 million.

53 > this discussion starts on page 53

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## Long term interventions

This section discusses the way forward for developing a long-term national approach to flood protection, underpinned by robust data.

64 > this discussion starts on page 64

# The project prioritisation approach we've used

A multi-stage assessment approach has been used to identify high-priority projects.

The diagram below shows the multi-stage process used to identify the priority projects across all 16 councils, noting that only 14 offered projects.

The resulting list of 92 projects meet the criteria of: accelerating climate change protection; incorporating environmental sensitivity/Te Mana o Te Wai considerations; able to be delivered within the next three years, and requiring funding assistance due to the limited resources and material deprivation of the communities.

These 92 projects were then prioritised based on deprivation (IMD) at the Territorial Authority (TA) level and this was used as a mechanism to apportion cost share between either 75% or 60%.

The following pages provide details of the individual projects.



## The Index of Multiple Deprivation (IMD)

The 2018 New Zealand Index of Multiple Deprivation (IMD18) is a set of tools for identifying concentrations of deprivation in New Zealand. The IMD18 comprises 29 indicators grouped into seven domains of deprivation: Employment, Income, Crime, Housing, Health, Education and Access to services. IMD18 is the combination of these seven domains, which may be used individually or combined.

IMD18 measures deprivation at the neighbourhood level in custom-designed 2018 data zones that have an average population of 761. Data zones are designed to produce better small area information without losing their contents to suppression or confidentiality.

The IMD provides a richer, more nuanced view of area level deprivation in New Zealand. Our vision is for the IMD and the data zones to be widely used for community advocacy, research, policy and resource allocation, providing a better measurement of area deprivation in New Zealand, improved outcomes for Māori, equity of service provision, and a more consistent approach to reporting and monitoring the social climate of New Zealand.

The 2018 Index of Multiple Deprivation is a project of the School of Population Health at the University of Auckland, and was developed by the IMD team: Dr Daniel John Exeter, Dr Arier Chi Lun Lee, Dr Jinfeng Zhao, Dr Sue Crengle, Annie Chiang and Michael Browne, with help and support from numerous individuals and organisations.

Source: *Index of Multiple Deprivation*. Retrieved <https://imdmapp.auckland.ac.nz/>

# How to read the analysis

The project listings are presented in a number of different ways on the following pages in order to inform decision makers.

1

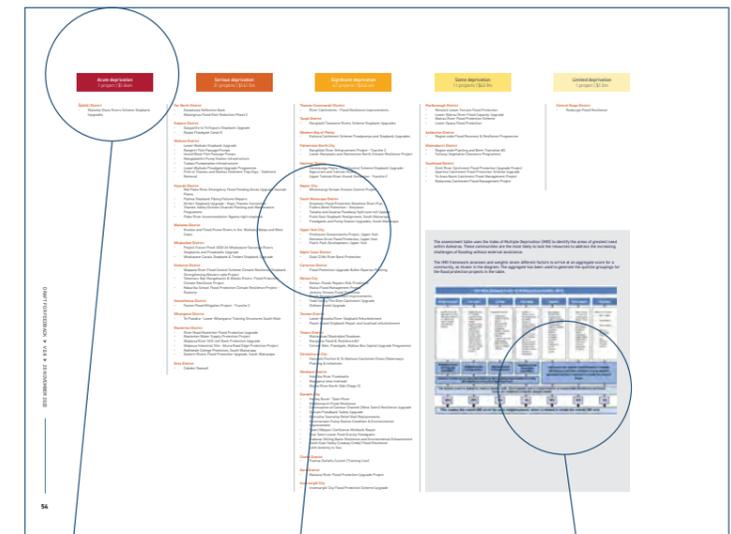
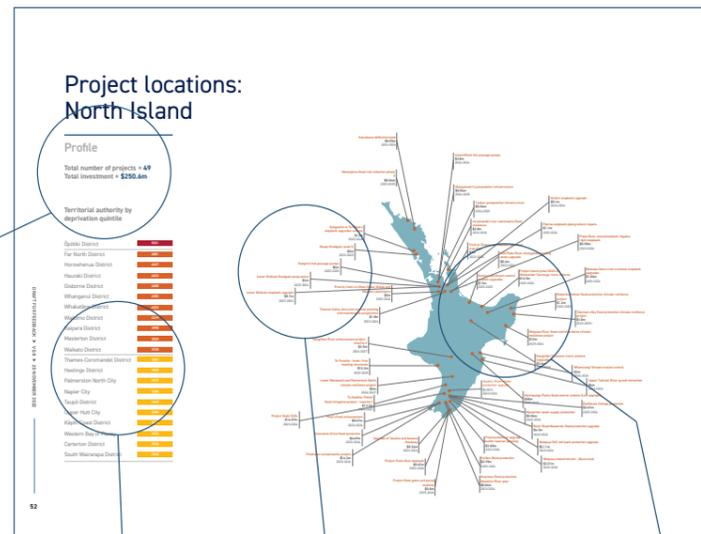
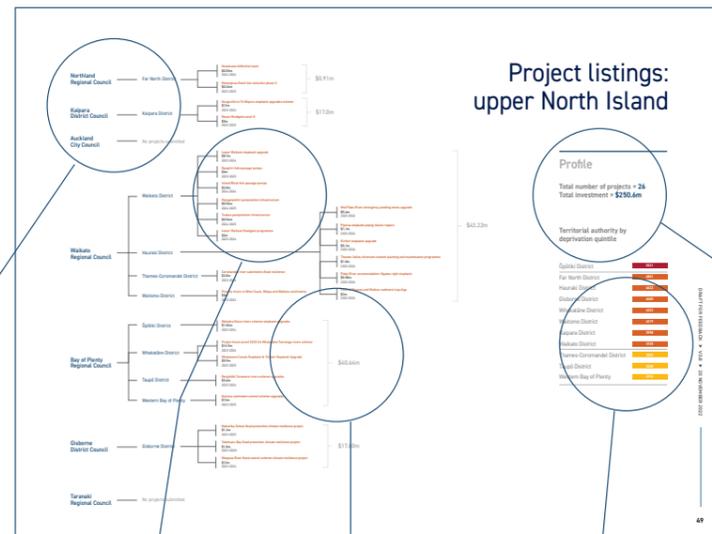
## Projects by Council

2

## Projects by location

3

## Projects by deprivation



**Regional Council and TA area**  
The projects are grouped by the responsible Regional Council and sub-grouped into territorial authority areas for geolocation and deprivation assessment.

**Project listing**  
The name, total value and the start and finish dates of each project are listed. Full details of projects including more detailed descriptions are contained in the tables in the Appendix.

**Regional Council investment**  
The total investment being made by each Regional Council is shown next to the project listings.

**Summary profile**  
The summary table contains the total number of projects and their total value for the grouping on the page.

**Deprivation status**  
The summary deprivation index for each territorial authority is shown, in order to provide some context for the need for investment assistance.

**Project listing**  
The name, total value and the start and finish dates of each project are listed. Full details of projects including more detailed descriptions are contained in the tables in the Appendix.

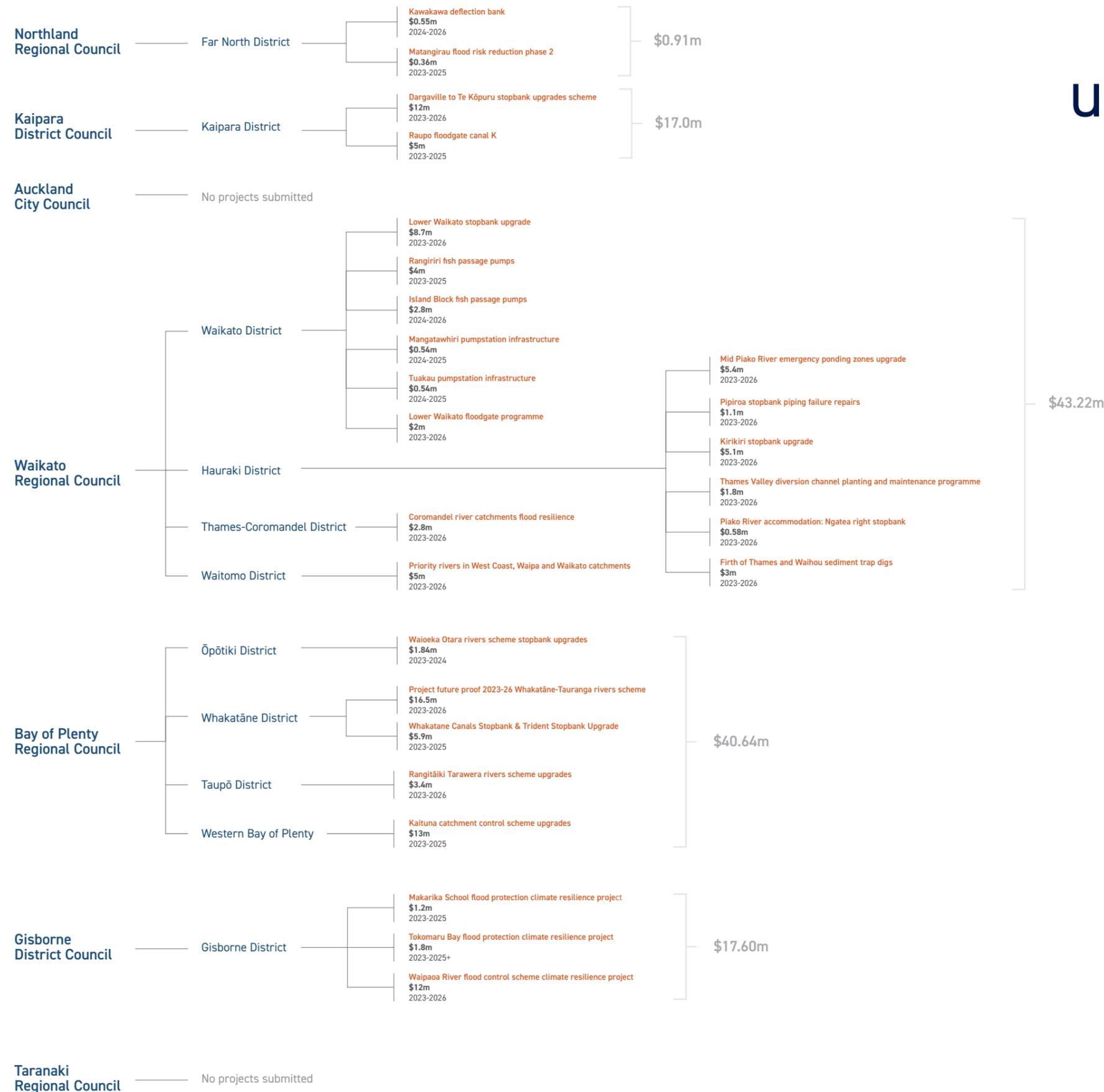
**Geographic location**  
The approximate geographic location of each project is shown on the relevant map.

**Deprivation level**  
The summary of the deprivation level based on the territorial authority is used to categorise the projects into quintiles.

**Project listing**  
The name, total value and the start and finish dates of each project are listed. Full details of projects including more detailed descriptions are contained in the tables in the Appendix.

**IMD methodology**  
The weighted approach to how the deprivation score has been derived from the seven source domains is shown for reference.

# Project listings: upper North Island



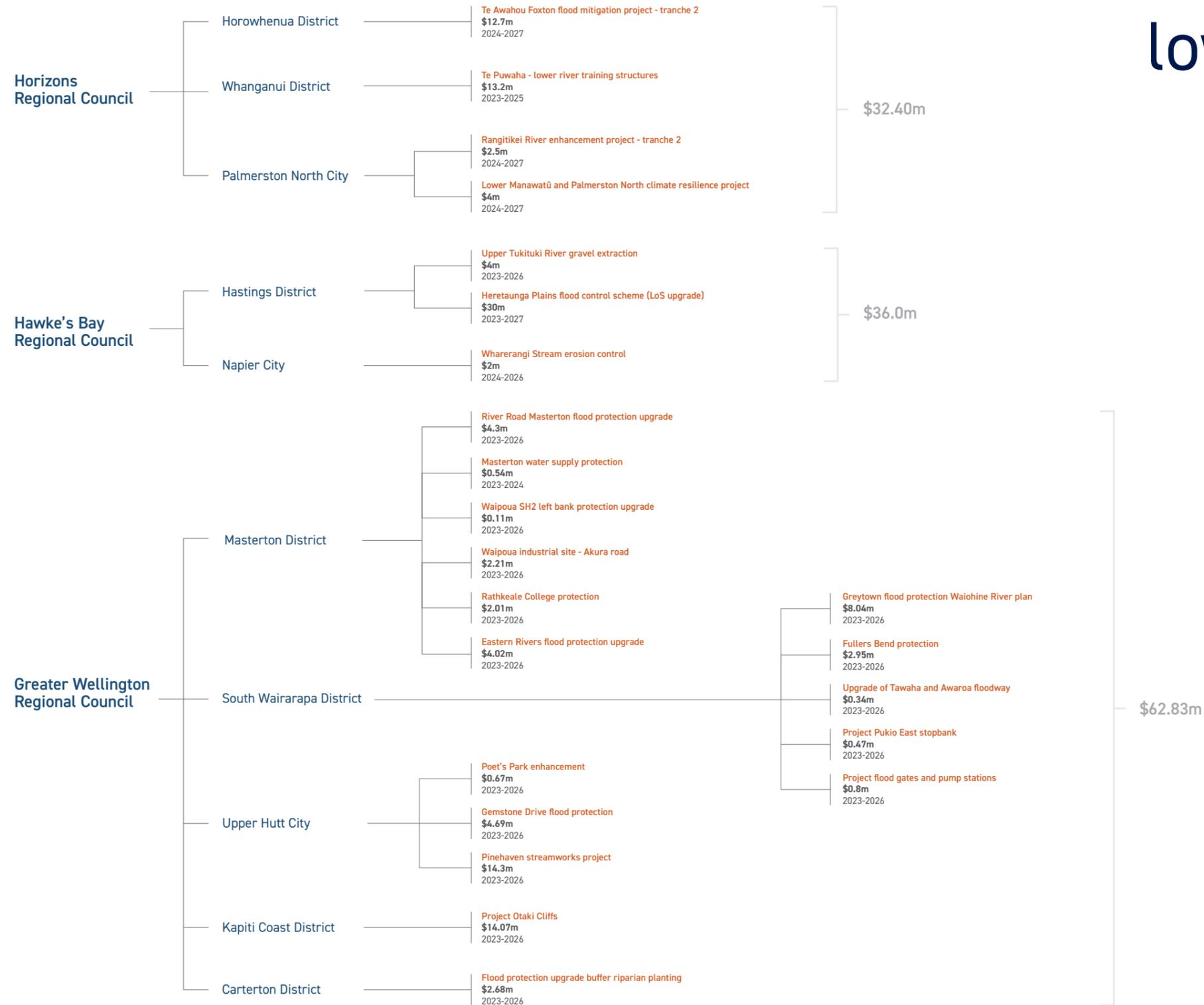
## Profile

Total number of projects = 26  
Total investment = \$119.37m

## Territorial authority by deprivation quintile

Ōpōtiki District	5321
Far North District	4801
Hauraki District	4622
Gisborne District	4480
Whakatāne District	4322
Waitomo District	4219
Kaipara District	3998
Waikato District	3725
Thames-Coromandel District	3593
Taupō District	3248
Western Bay of Plenty	2933

# Project listings: lower North Island



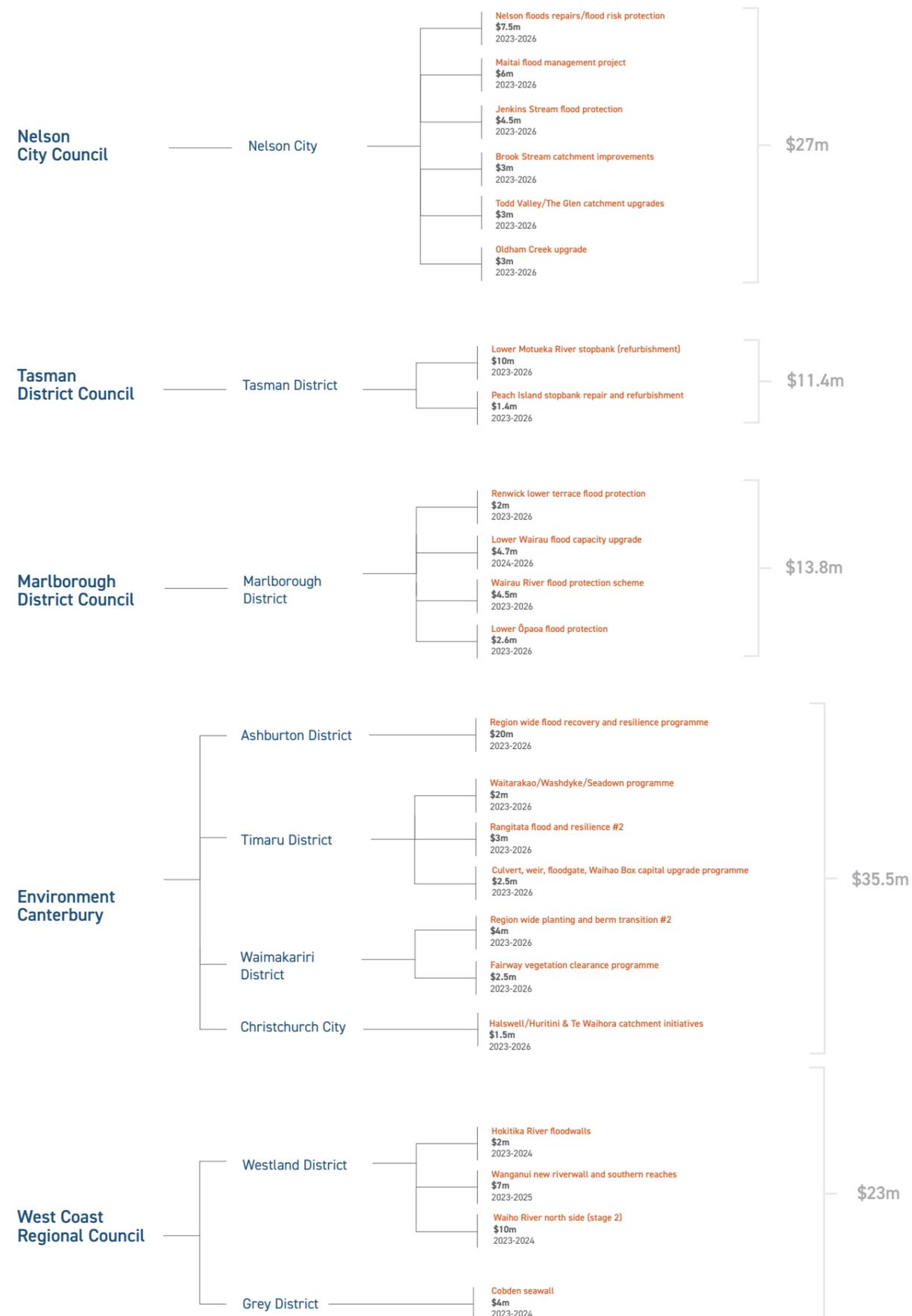
## Profile

Total number of projects = 23  
Total investment = \$131.2m

## Territorial authority by deprivation quintile

Horowhenua District	4627
Whanganui District	4383
Masterton District	3939
Hastings District	3535
Palmerston North City	3519
Napier City	3390
Upper Hutt City	3200
Kāpiti Coast District	3095
Carterton District	2728
South Wairarapa District	2565

# Project listings: upper South Island



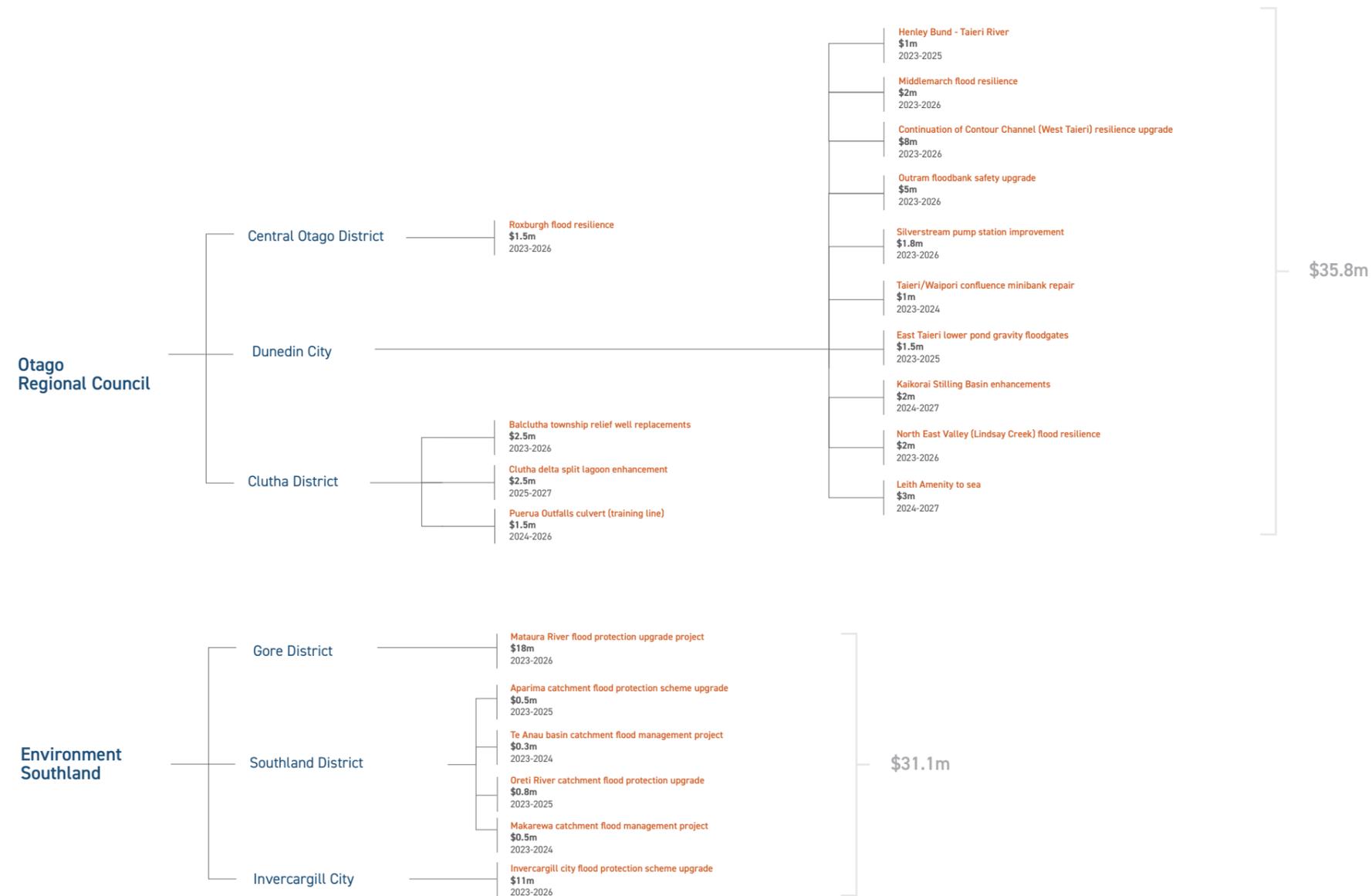
## Profile

Total number of projects = 23  
Total investment = \$110.7m

## Territorial authority by deprivation quintile

Grey District	3896
Westland District	3032
Nelson City	2911
Christchurch City	2831
Timaru District	2641
Tasman District	2517
Marlborough District	2449
Ashburton District	2314
Waimakariri District	2204

# Project listings: lower South Island



## Profile

Total number of projects = **20**  
Total investment = **66.9m**

## Territorial authority by deprivation quintile

Invercargill City	3395
Gore District	3044
Clutha District	2813
Dunedin City	2791
Southland District	1879
Central Otago District	1217

# Project locations: North Island

## Profile

Total number of projects = **49**  
Total investment = **\$250.6m**

### Territorial authority by deprivation quintile

Ōpōtiki District	5321
Far North District	4801
Horowhenua District	4627
Hauraki District	4622
Gisborne District	4480
Whanganui District	4383
Whakatāne District	4322
Waitomo District	4219
Kaipara District	3998
Masterton District	3939
Waikato District	3725
Thames-Coromandel District	3593
Hastings District	3535
Palmerston North City	3519
Napier City	3390
Taupō District	3248
Upper Hutt City	3200
Kāpiti Coast District	3095
Western Bay of Plenty	2933
Carterton District	2728
South Wairarapa District	2565



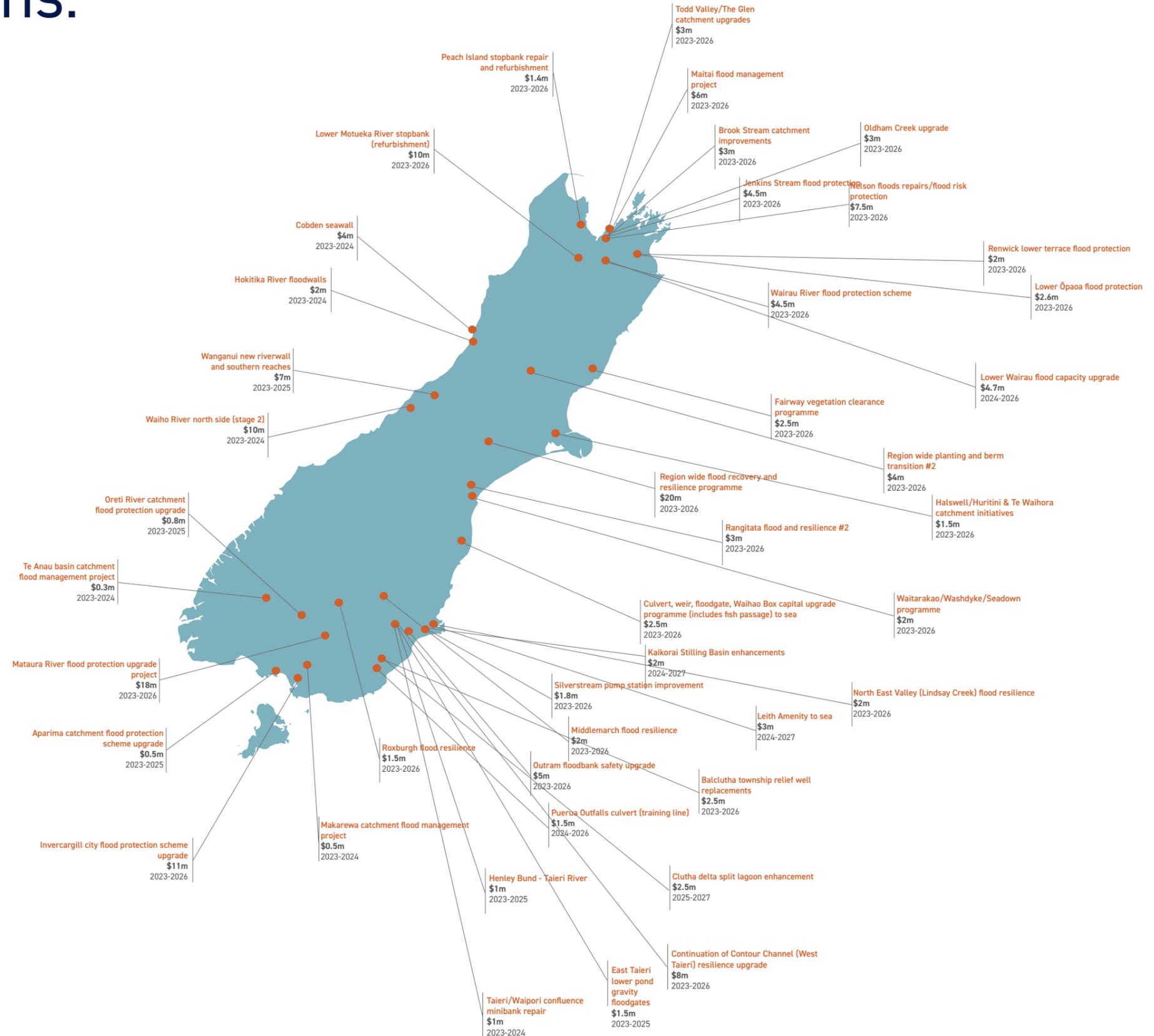
# Project locations: South Island

## Profile

Total number of projects = **43**  
Total investment = **\$177.6m**

## Territorial authority by deprivation quintile

Grey District	3896
Invercargill City	3395
Gore District	3044
Westland District	3032
Nelson City	2911
Christchurch City	2831
Clutha District	2813
Dunedin City	2791
Timaru District	2641
Tasman District	2517
Marlborough District	2449
Ashburton District	2314
Waimakariri District	2204
Southland District	1879
Central Otago District	1217



**Acute deprivation**  
1 project | \$1.84m

**Serious deprivation**  
31 projects | \$141.5m

**Significant deprivation**  
47 projects | \$240.4m

**Some deprivation**  
11 projects | \$43.9m

**Limited deprivation**  
1 project | \$1.5m

- Ōpōtiki District**
- Waioeka Otara Rivers Scheme Stopbank Upgrades

- Far North District**
- Kawakawa Deflection Bank
  - Matangirau Flood Risk Reduction Phase 2

- Kaipara District**
- Dargaville to Te Kopuru Stopbank Upgrade
  - Raupo Floodgate Canal K

- Waikato District**
- Lower Waikato Stopbank Upgrade
  - Rangiriri Fish Passage Pumps
  - Island Block Fish Passage Pumps
  - Mangatawhiri Pump Station Infrastructure
  - Tuakau Pumpstation Infrastructure
  - Lower Waikato Floodgate Upgrade Programme
  - Firth of Thames and Waihou Sediment Trap Digs - Sediment Removal

- Hauraki District**
- Mid Piako River Emergency Flood Ponding Zones Upgrade Hauraki Plains
  - Pipiroa Stopbank Piping Failures Repairs
  - Kirikiri Stopbank Upgrade - Kopu Thames Connection
  - Thames Valley Division Channel Planting and Maintenance Programme
  - Piako River Accommodation: Ngatea right stopbank

- Waitomo District**
- Erosion and Flood Prone Rivers in the Waikato, Waipa and West Coast

- Whakatāne District**
- Project Future Proof 2023-26 Whakatane-Tauranga Rivers Stopbanks and Floodwalls Upgrade
  - Whakatane Canals Stopbank & Trident Stopbank Upgrade

- Gisborne District**
- Waipaoa River Flood Control Scheme Climate Resilience Stopbank Strengthening Western side Project
  - Tokomaru Bay Mangahauini & Waitou Rivers Flood Protection Climate Resilience Project
  - Makarika School Flood Protection Climate Resilience Project - Ruatoria

- Horowhenua District**
- Foxton Flood Mitigation Project - Tranche 2

- Whanganui District**
- Te Puwaha - Lower Whanganui Training Structures South Mole

- Masterton District**
- River Road Masterton Flood Protection Upgrade
  - Masterton Water Supply Protection Project
  - Waipoua River SH2 Left Bank Protection Upgrade
  - Waipoua Industrial Site - Akura Road Edge Protection Project
  - Rathkeale College Protection, South Wairarapa
  - Eastern Rivers Flood Protection Upgrade, South Wairarapa

- Grey District**
- Cobden Seawall

- Thames-Coromandel District**
- River Catchments - Flood Resilience Improvements

- Taupō District**
- Rangitaiki Tarawera Rivers Scheme Stopbank Upgrades

- Western Bay of Plenty**
- Kaituna Catchment Scheme Floodpumps and Stopbank Upgrades

- Palmerston North City**
- Rangitikei River Enhancement Project - Tranche 2
  - Lower Manawatu and Palmerston North Climate Resilience Project

- Hastings District**
- Heretaunga Plains Flood Control Scheme Stopbank Upgrade - Ngaruroro and Tukituki Rivers
  - Upper Tukituki River Gravel Extraction - Tranche 2

- Napier City**
- Wharerangi Stream Erosion Control Project

- South Wairarapa District**
- Greytown Flood Protection Waiohine River Plan
  - Fullers Bend Protection - Greytown
  - Tawaha and Awaroa Floodway Spill-over-sill Update
  - Pukio East Stopbank Realignment, South Wairarapa
  - Floodgates and Pump Station Upgrades, South Wairarapa

- Upper Hutt City**
- Pinehaven Streamworks Project, Upper Hutt
  - Gemston Drive Flood Protection, Upper Hutt
  - Poet's Park Development, Upper Hutt

- Kāpiti Coast District**
- Otaki Cliffs River Bank Protection

- Carterton District**
- Flood Protection Upgrade Buffer Riparian Planting

- Nelson City**
- Nelson Floods Repairs Risk Protection
  - Maitai Flood Management Project
  - Jenkins Stream Flood Protection
  - Brook Stream Catchment Improvements
  - Todd Valley/The Glen Catchment Upgrade
  - Oldham Creek Upgrade

- Tasman District**
- Lower Motueka River Stopbank Refurbishment
  - Peach Island Stopbank Repair and localised refurbishment

- Timaru District**
- Waitarakao/Washdyke/Seadown
  - Rangitata Flood & Resilience #2
  - Culvert Weir, Floodgate, Waihao Box Capital Upgrade Programme

- Christchurch City**
- Halswell/Huritini & Te Waihora Catchment Drain/Waterways Planting & Initiatives

- Westland District**
- Hokitika River Floodwalls
  - Wanganui new riverwall
  - Waiho River North Side (Stage 2)

- Dunedin City**
- Henley Bund - Taieri River
  - Middlemarch Flood Resilience
  - Continuation of Contour Channel (West Taieri) Resilience Upgrade
  - Outram Floodbank Safety Upgrade
  - Balclutha Township Relief Wall Replacements
  - Silverstream Pump Station Condition & Environmental Improvement
  - Taieri/Waipori Confluence Minibank Repair
  - East Taieri Lower Pond Gravity Floodgates
  - Kaikorai Stilling Basin Resilience and Environmental Enhancement
  - North East Valley (Lindsay Creek) Flood Resilience
  - Leith Amenity to Sea

- Clutha District**
- Puerua Outfalls Culvert (Training Line)

- Gore District**
- Mataura River Flood Protection Upgrade Project

- Invercargill City**
- Invercargill City Flood Protection Scheme Upgrade

- Marlborough District**
- Renwick Lower Terrace Flood Protection
  - Lower Wairau River Flood Capacity Upgrade
  - Wairau River Flood Protection Scheme
  - Lower Opaoa Flood Protection

- Ashburton District**
- Region wide Flood Recovery & Resilience Programme

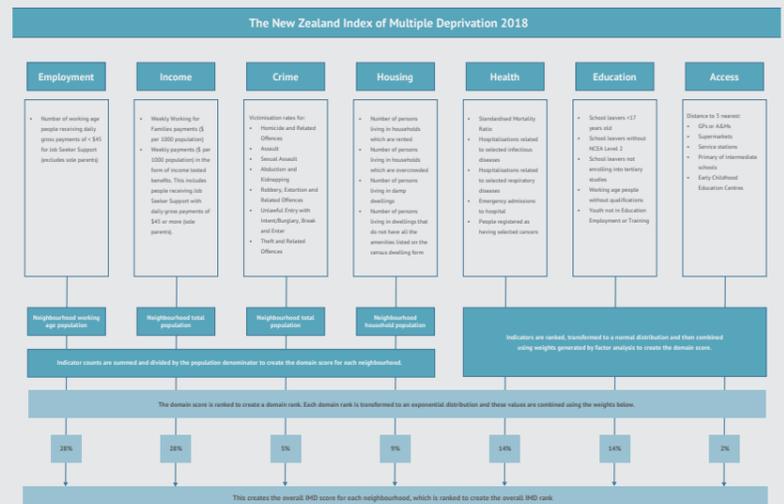
- Waimakariri District**
- Region wide Planting and Berm Transition #2
  - Fairway Vegetation Clearance Programme

- Southland District**
- Oreti River Catchment Flood Protection Upgrade Project
  - Aparima Catchment Flood Protection Scheme Upgrade
  - Te Anau Basin Catchment Flood Management Project
  - Makarewa Catchment Flood Management Project

- Central Otago District**
- Roxburgh Flood Resilience

The assessment table uses the Index of Multiple Deprivation (IMD) to identify the areas of greatest need within Aotearoa. These communities are the most likely to lack the resources to address the increasing challenges of flooding without external assistance.

The IMD framework assesses and weights seven different factors to arrive at an aggregate score for a community, as shown in the diagram. The aggregate has been used to generate the quintile groupings for the flood protection projects in the table.



# Funding and deprivation

A deprivation-based approach has been used to allocate national funding, using a 75/60 model.

Following the recent steer by DIA as well as the focus on deprived communities in the 2020 Cabinet Paper, we have used deprivation as both a prioritisation tool for the most vulnerable region, as well as a suggested mechanism for apportioning cost share across projects.

The methodology is based on a region - here, we refer to the Territorial Authority (TA) level - being allocated a co-investment contribution based on ability to fund the flood protection measures from the regional ratepayer base.

Thus, majority of regions are allocated a co-investment contribution of 60%, with the most deprived territorial authority - Ōpōtiki District - getting a higher rate of 75%. This higher deprivation

The table at right summarises the funding breakdown across projects and shows what the allocation of investment between central government and regional councils might look like with this approach.

As indicated, the central government investment is \$257.2m and the regional council investment is \$171m.

Territorial Authority (TA)	IMD (Total)	Level of assistance	Total Project Cost	Crown	Regional
Ōpōtiki District	5321	75%	\$1.84	\$1.38	\$0.46
Far North District (2)	4801	60%	\$0.91	\$0.55	\$0.36
Horowhenua District	4627	60%	\$12.70	\$7.62	\$5.08
Hauraki District (6)	4622	60%	\$16.98	\$10.19	\$6.79
Gisborne District (3)	4480	60%	\$17.60	\$10.56	\$7.04
Whanganui District	4383	60%	\$13.20	\$7.92	\$5.28
Whakatane District (2)	4322	60%	\$22.40	\$13.44	\$8.96
Waitomo District	4219	60%	\$5.00	\$3.00	\$2.00
Kaipara District (2)	3998	60%	\$17.00	\$10.20	\$6.80
Masterton District (6)	3939	60%	\$13.19	\$7.91	\$5.28
Grey District	3896	60%	\$4.00	\$2.40	\$1.60
Waikato District (6)	3725	60%	\$18.44	\$11.06	\$7.38
Thames-Coromandel District	3593	60%	\$2.80	\$1.68	\$1.12
Hastings District (2)	3535	60%	\$34.00	\$20.40	\$13.60
Palmerston North City (2)	3519	60%	\$6.50	\$3.90	\$2.60
Invercargill City	3395	60%	\$11.00	\$6.60	\$4.40
Napier City	3390	60%	\$2.00	\$1.20	\$0.80
Taupo District	3248	60%	\$3.40	\$2.04	\$1.36
Upper Hutt City (3)	3200	60%	\$19.66	\$11.80	\$7.86
Kapiti Coast District	3095	60%	\$14.70	\$8.82	\$5.88
Gore District	3044	60%	\$18.00	\$10.80	\$7.20
Westland District (3)	3032	60%	\$19.00	\$11.40	\$7.60
Western Bay of Plenty	2933	60%	\$13.00	\$7.80	\$5.20
Nelson City (6)	2911	60%	\$27.00	\$16.20	\$10.80
Christchurch City	2831	60%	\$1.50	\$0.90	\$0.60
Clutha District (3)	2813	60%	\$6.50	\$3.90	\$2.60
Dunedin City (10)	2791	60%	\$27.80	\$16.68	\$11.12
Carterton District	2728	60%	\$2.68	\$1.61	\$1.07
Timaru District (3)	2641	60%	\$7.50	\$4.50	\$3.00
South Wairarapa District (5)	2565	60%	\$12.60	\$7.56	\$5.04
Tasman District (2)	2517	60%	\$11.40	\$6.84	\$4.56
Marlborough District (4)	2449	60%	\$13.80	\$8.28	\$5.52
Ashburton District	2314	60%	\$20.00	\$12.00	\$8.00
Waimakariri District (2)	2204	60%	\$6.50	\$3.90	\$2.60
Southland District (4)	1879	60%	\$2.10	\$1.26	\$0.84
Central Otago District	1217	60%	\$1.50	\$0.90	\$0.60
<b>Total investment</b>			<b>\$428.20</b>	<b>\$257.20</b>	<b>\$171.00</b>

# Project information: additional detail

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## Financial summary

More information about the financial aspects of the investment, including the proposed co-investment model and cashflows are contained in the Financial Case.

72 > this discussion starts on page 72

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## Delivery timelines

More information about the delivery sequencing for the projects, including a summary GANTT chart for each Regional Council, is contained in the Implementation Approach section.

75 > this discussion starts on page 75

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## Project details

The Appendix contains the detailed tables, including a high level description of each project as provided by the responsible Regional Council.

xx > this discussion starts on page 99



Image: Kuaotunu Estuary, Coromandel

# Developing a long-term approach

The 92 projects identified in the analysis will enable immediate action to be taken in some of the most flood-prone areas of Aotearoa, focused on the most vulnerable communities. Work on essential projects can commence at the beginning of FY23/24 and will largely be completed within three years, to the benefit of communities and the economy.

However, the continuation of the shovel-ready funding provided by the Government is not a long-term solution to the national challenges presented by climate change. Building resilience as climate disruption grows will require a concerted and joined-up approach across national and regional government, working from effective policy focused on the full range of PARA interventions.

To enable long-term solutions to be developed, two components are required:

- The policy, funding and implementation frameworks required to bridge the gap between national strategies and local projects
- Accurate and thorough national data on flooding risk, vulnerability and options, to enable effective prioritisation of projects and interventions within the PARA framework.

Aotearoa is not the first nation to grapple with the complexities of flood protection, co-investment and potential insurance withdrawal. The UK has made changes to its approach based on the assessment of major events, so a case study is presented as a starting point for how we may wish to think about long-term options.

These three elements – policy, a national data model and the experiences of the UK – are discussed on the following pages.

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## Policy and implementation

The proposed approach to developing and implementing a new national framework for flood protection, creating the link from evolving central government policy to local projects and interventions.

65 > this discussion starts on page 65

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## The UK case study

Major flooding in 2007 led the UK to review and overhaul its national approach to flood protection, and there may be useful lessons for how the challenges were addressed.

68 > this discussion starts on page 68

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## National data modelling

Making informed and consistent decisions about local-level interventions within a PARA framework will require consistent and accurate data from across the country, and an integrated model is required.

70 > this discussion starts on page 70

# The options for longer term intervention

There are a range of options for central government intervention varying in terms of costs and risk profiles.

**Investing in flood resilience through PARA represents the least risky and most cost-effective and equitable option forward.**

The figure at right illustrates the range of central government intervention options in flood risk. These options range from preventative spending through to dealing with the consequences post-flooding.

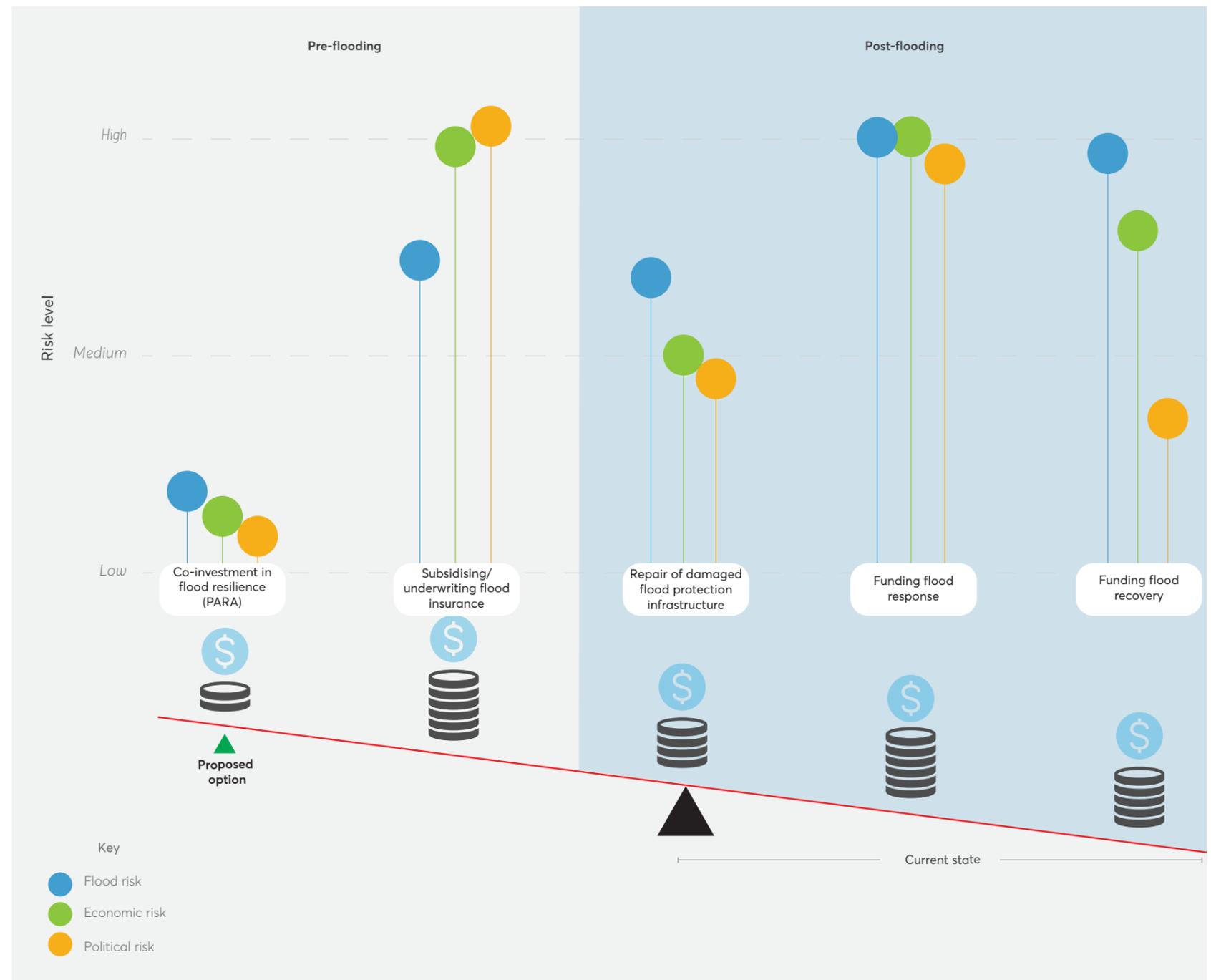
The risk profile for each option is depicted. This includes:

- Economic risks such as increased Crown liability or debt as well as increased future spending due to climate change impacts,
- Political risks such as incentivising risk-taking, creating unrealistic or impractical public expectations for intervention, and erosion of public trust and confidence, and
- The likelihood of spending reducing future flood risk.

The relative financial costs of each option is also indicated.

In weighing both risks and costs, it becomes evident that co-investment in flood resilience through the PARA framework is the most cost-effective option.

It is also the pathway that most equitably allows for sharing the costs of climate change across government, industry, and the public. This is our proposed option.



# Developing a sustainable flood management co-investment model

Agreeing a new national approach will need input from national and regional government, as well as the perspectives of the insurance industry.

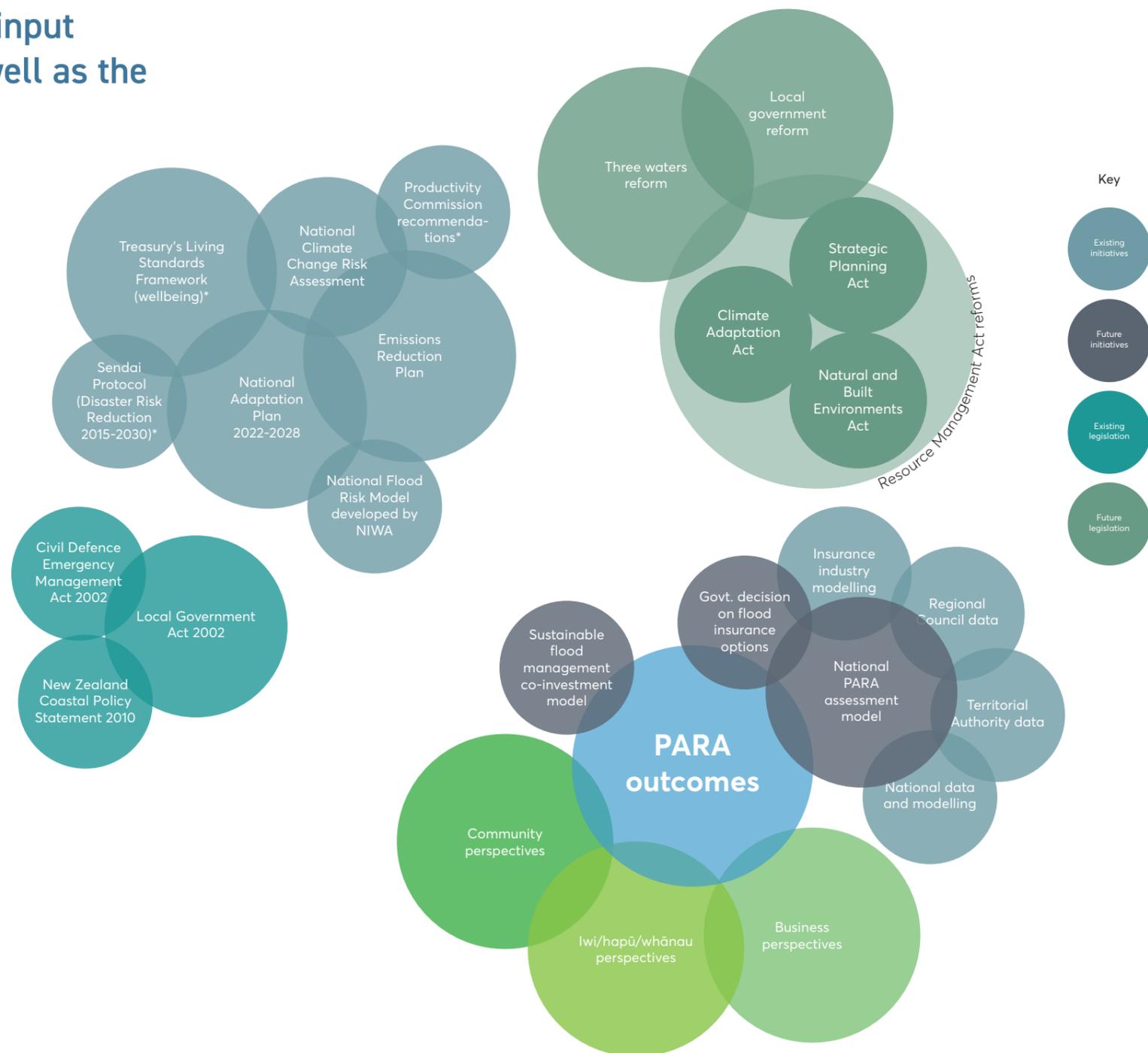
Getting beyond the current project-based approach requires the development of a sustainable model for co-investment. This model will require a range of inputs, as the diagram at right notes:

- The planned changes to the legislative and regulatory frameworks in a range of areas – from climate change to local government – will need to be taken into account as both enabling and constraining factors
- In particular, there is a need for legislation to consider flood protection projects within the context of climate change adaptation as a matter of national interest
- Existing legislation will likewise form part of the foundation for how and why governance, implementation and funding is apportioned between different agencies and tiers of government
- The perspectives of the community, iwi and the business sector need to be taken into account.

There are a number of matters that need to be addressed as part of the work, notably:

- The governance, authority and responsibility of the various entities and agencies responsible for national flood protection
- The intersection between flood protection and other PARA-related factors, such as planning controls in flood-prone areas
- The equitable share of funding between central regional and local government, and the participation of the insurance industry in helping develop solutions
- The processes and decision points used to make investment decisions about flood protection initiatives within the PARA framework.

Developing the co-investment model will require a range of agencies to be involved alongside Te Uru Kahika. The proposed work plan for how this will be achieved is shown on subsequent pages.



# Developing a sustainable flood management co-investment model

**Agreeing a new national approach will also require further work to determine an equitable long-term co-investment commitment.**

Based on the current Regional Council funding in the current LTPs the total investment in the 10 year LTP horizon out to 2032 is \$3.1B. In the 3 years out to 2026 the sum outside the scope of this co-funding request is \$627m.

However, as experience across the country shows, even this level of self-funding and investment from communities is insufficient in the face of the evolving climate change challenges. A more sustainable co-investment model – reflecting a genuine partnership between central and local government – is required to address our future flood resilience needs.

Previous work by Te Uru Kahika has estimated the likely cost of this work at around \$350 million pa. Regional councils have recently committed their investment at \$200 million pa; an increase from the previous \$175 million pa. This leaves an annual shortfall of \$150 million - the suggested co-investment amount from central government long-term.

However, additional work is needed to confirm whether this amount will be sufficient. This work would clarify the:

- Preferred level of service for all 367 flood protection schemes in Aotearoa (at a level of 1:100 or better)

- Cost required to achieve expected service levels
- Prioritisation of projects across the country
- Cost share between central and regional councils, and how this is apportioned across different regions
- Intended benefits, including cost savings, from flood damage or harm averted
- How these investments relate to the different PARA measures; Te Mana o Te Wai considerations; as well as environmental and considerations
- Relationship between flood protection investment and Waka Kotahi and/or Kiwi Rail infrastructure improvement plans.

The likely investment for this work is indicated in the work plan on p71. The primary outcome of this work will be to determine a long-term and equitable co-investment amount that can be agreed upon with central government – as a budgetary allocation for an agency such as DIA – toward improving our communities' resilience against flood risk and related climate change effects.



The equitable funding of essential flood protection infrastructure in a world increasingly challenged by climate change is an issue for many governments. After extensive flooding in 2007, the UK government reviewed its national strategy – and there are potential learnings for Aotearoa New Zealand in their findings and their path forwards.

# Case study: the UK model

## The 2007 floods in the UK and the subsequent review triggered an overhaul of the country's flood management approach.

In the summer of 2007 a series of major food events in the UK resulted in devastating impacts on lives, homes, infrastructure, and businesses.

Thirteen people lost their lives while around 7,000 were rescued by emergency services; representing one of the biggest rescue efforts in peacetime Britain. More than 55,000 properties were damaged along with essential water, electricity, and transport services.

Against a backdrop of over 200 major floods worldwide in the same year, the floods in England were ranked most expensive at an estimated £3 billion.

The magnitude of impact as well as criticism over the government's response prompted a review of existing flood management practices, resulting in one of the widest ranging policy reviews conducted in the UK: the Pitt review.

The review found that the existing approach to flood management lacked coordination and structure, and that "responses to local flood risk are piecemeal and not necessarily prioritised ... This results in investment decisions being made in isolation, which at best leads to inefficiencies and at worst actually increases the risk of flooding."

The findings of the Pitt review were translated into 92 recommendations, including setting out a long-term approach to funding flood risk management supported within a policy framework. Essentially, this review triggered an overhaul of the UK's approach to flood management, including the introduction of the Flood and Water Management Act (2010).



Responses to local flood risk are piecemeal and not necessarily prioritised ... This result in investment decisions being made in isolation, which at best leads to inefficiencies and at worst actually increases the risk of flooding.

Source: Pitt, M. (2008). *Learning lessons from the 2007 floods: The Pitt Review*. Cabinet Office, London.



Image: UK floods in 2007 on the River Ouse, York

# Case study: the UK model

## The Grant in Aid co-investment mechanism calculates the proportion of a flood scheme eligible for central government funding.

The Flood and Water Management Act (2010) guides the management of flood and coastal erosion risk in most of the UK.

Under the Act local risk management authorities (primarily Lead Local Flood Authority) and the Environment Agency (EA) were delegated responsibilities for flood management, and a framework for funding flood resilience measures was developed. Within this context, the EA initiated the Grant in Aid (GiA) process to fund flood resilience schemes.

The GiA process assesses and quantifies the benefits of flood schemes, ranging in scale from the individual property to city level, in a nationally consistent manner. Benefits are quantified in terms of both scale and duration, and any type of flood scheme - not just structural - can be assessed.

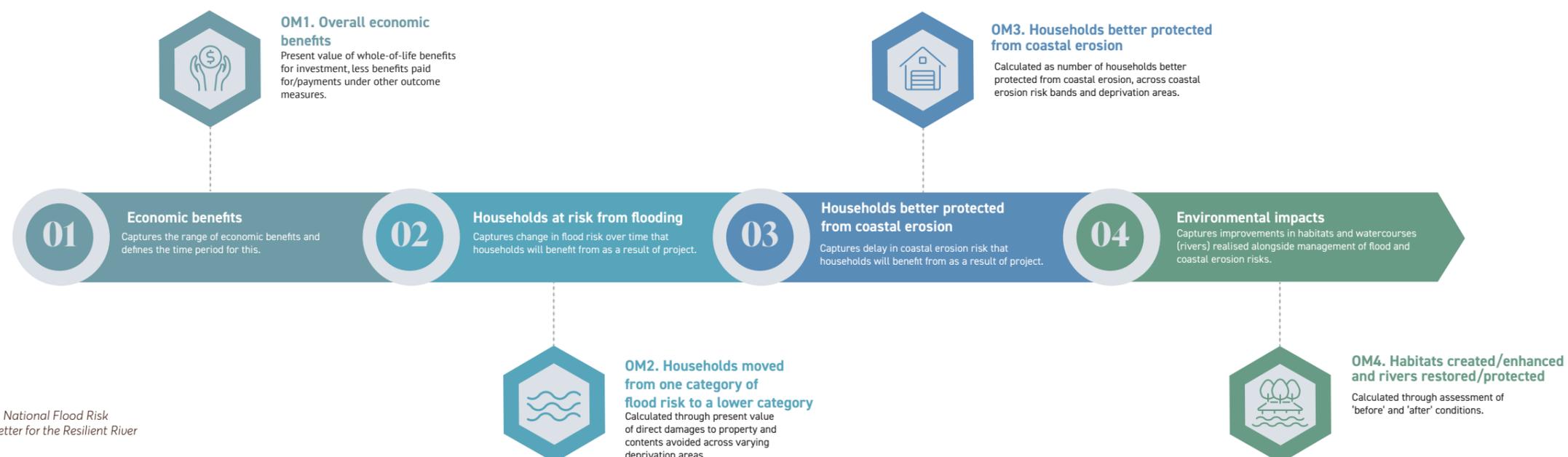
This is done through the Partnership Funding (PF) calculator, which determines how much central government funding a proposed scheme is eligible for. The PF calculator precedes the submission of a more formal business case.

As illustrated in the infographic below, investment decisions are prioritised against four basic outcome measures or criteria:

1. Benefit: Cost Ratio (BCRs), including whole of life benefits
2. Lowering flood risk for deprived communities
3. Level of service/standard of protection
4. Environmental obligations and benefits

An outcome measure score is then calculated. The threshold for receiving central government funding is typically an outcome measure score with a BCR of 18:1 (£18 of benefits for every £ spent), although schemes with lower BCRs may still receive funding with other contributions required to bridge the gap.

This is an example of a co-investment mechanism that enables funding from multiple (local government, central government, private, insurance, and non-governmental) sources.



Source: Tonkin & Taylor. (2022). National Flood Risk Management Funding Model: A letter for the Resilient River Communities.

# Accurate data is the key to good decisions

Effective national prioritisation can only be conducted once there is an accurate model of flooding risk and possible interventions.

At the heart of the PARA model is the need to decide which interventions make the best sense for individual communities facing increased risk from flooding. PARA assumes the various options – from engineering to risk acceptance, and from managed retreat to increased resilience – have been considered and weighed, and an informed decision made. It further assumes these decisions are made in a consistent and equitable way across Aotearoa and national priorities assigned.

While much of the data about flood risk and engineering mitigations exists, it does so within the 16 Regional Councils. As the process of identifying and prioritising the 55 shovel-ready Kānoa projects and this subsequent request for 92 urgent projects shows, it is currently difficult to bring together, integrate and compare the data across the country.

Further, there is currently no agreed approach to how the different aspects of the PARA framework – from building resilience to managed retreat – are valued and evaluated. The current approach is very much case-by-case and place-by-place; and while this suffices for individual communities, it makes it difficult to obtain a national picture and develop national priorities.

The intention is therefore to develop a national PARA assessment model, under the auspices of Te Uru Kahika. The purpose of this model is to:

- Integrate the data held by Regional Councils about flooding risk and mitigation approaches across Aotearoa
- Integrate the national modelling about climate and flooding risk held by NIWA and other

organisations

- Integrate the Regional Council flood protection projects into a single view of all planned and proposed interventions
- Implement a PARA valuation methodology for all planned and proposed interventions, grounded in sound economic analysis and informed by the Living Standards Framework
- Provide a prioritisation and decision support tool for agencies and Regional Councils to make investment decisions about specific projects and initiatives, and to provide a national view of activity, investment flows and benefits.

While the model will be developed and managed by Te Uru Kahika, the underlying data – about regions, flooding risk, interventions and projects – will continue to be controlled and managed by the responsible Regional Council or other organisation (such as NIWA). The purpose of the model is integration, valuation, benefits assessment and decision support, so it does not supplant any of the existing systems or processes across the Regional Council sector.

As is the case with all sectoral data projects, one of the workstreams within the data modelling project will focus on data sovereignty, data governance and privacy compliance. Guidance from Statistics NZ may also be sought to assess the possibility of integration with or incorporation into the national Integrated Data Infrastructure (IDI).

## PARA, investment and benefits analysis

While the data will be sourced from – and remain under the control of – the Regional Councils, the model will contain the elements necessary to make informed decisions about flood protection under the PARA framework. This will include:

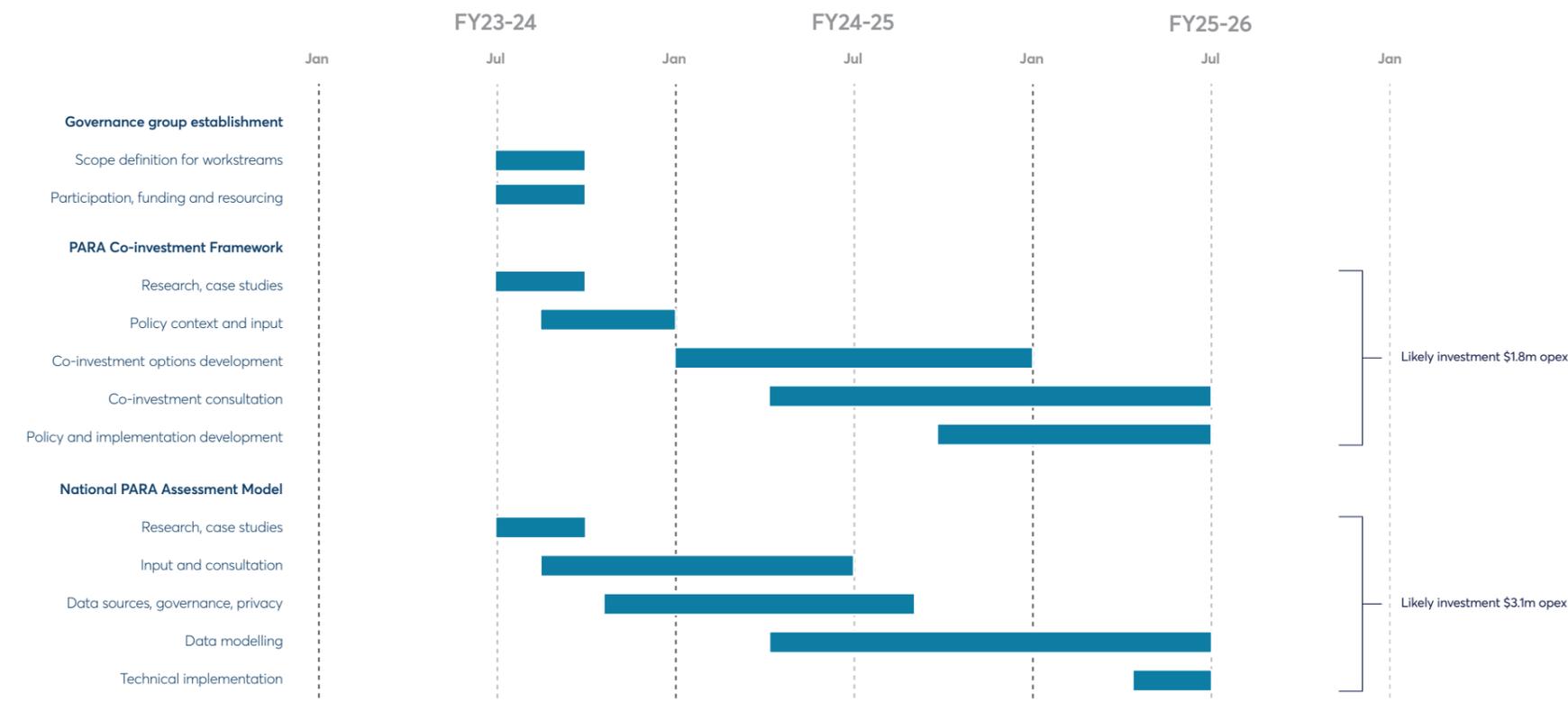
- The investment requirements for each project and each option being assessed (such as resilience investment or managed retreat)
- The wellbeing valuations for each option, including both the financial and non-financial costs and benefits, based on sound economic analysis grounded in the Living Standards Framework
- A prioritisation framework, which will allow different projects with quite different PARA approaches to be compared on a like-for-like basis, in order to aid informed decision making
- A benefits tracking model, which will allow the outcomes to be evaluated against the original investment criteria to ensure investment accountability.

The model will require significant development and ongoing management to ensure it operates in the way intended. The process for developing the model is described on the following page.

# The sustainable co-investment work plan

Work on both the policy aspects and the national model can commence in FY23/24.

Developing the correct PARA policy frameworks and supporting data model will require a separate project, with an agreed governance structure, participating councils and agencies, and input from iwi, the insurance sector and other key stakeholders. Initial opex funding for this work has been included within the bid for Budget 23, and an initial high-level project plan with resourcing estimates is shown below.



## Coordinating across the sector

Given the nature and implications of flood protection, it is likely that a range of agencies will wish to contribute to the development of the sustainable co-investment approach, and may wish to either provide data to or receive information from the national PARA assessment model. In addition, a range of interested parties will also wish to participate in both the policy development and the data modelling, including iwi and the insurance industry.

And in order for the theory of PARA to be translated into effective policy, operational initiatives and on-the-ground activities, it will be necessary for the work to be anchored in the reality of what can be achieved for and with communities across Aotearoa. For this reason, it is proposed that Te Uru Kahika act as the coordinating body for the policy work and the data modelling, using a shared governance model with appropriate central government agencies.

Undertaking this work will require resourcing and funding on behalf of Te Uru Kahika and agencies. The budgets at left represent the commitments of time and resource over the next three years required to achieve the policy outcomes and data model, over and above existing baselines. In practice, it is anticipated that some existing baseline resource will also be contributed from regional councils and participating agencies.

It is proposed that these further areas of work are developed into a separate business case, under the auspices of the proposed governance entity, in order to define the scope and outcomes expected and confirm the resourcing and budget for the activity.

# 4.0

## Financial case

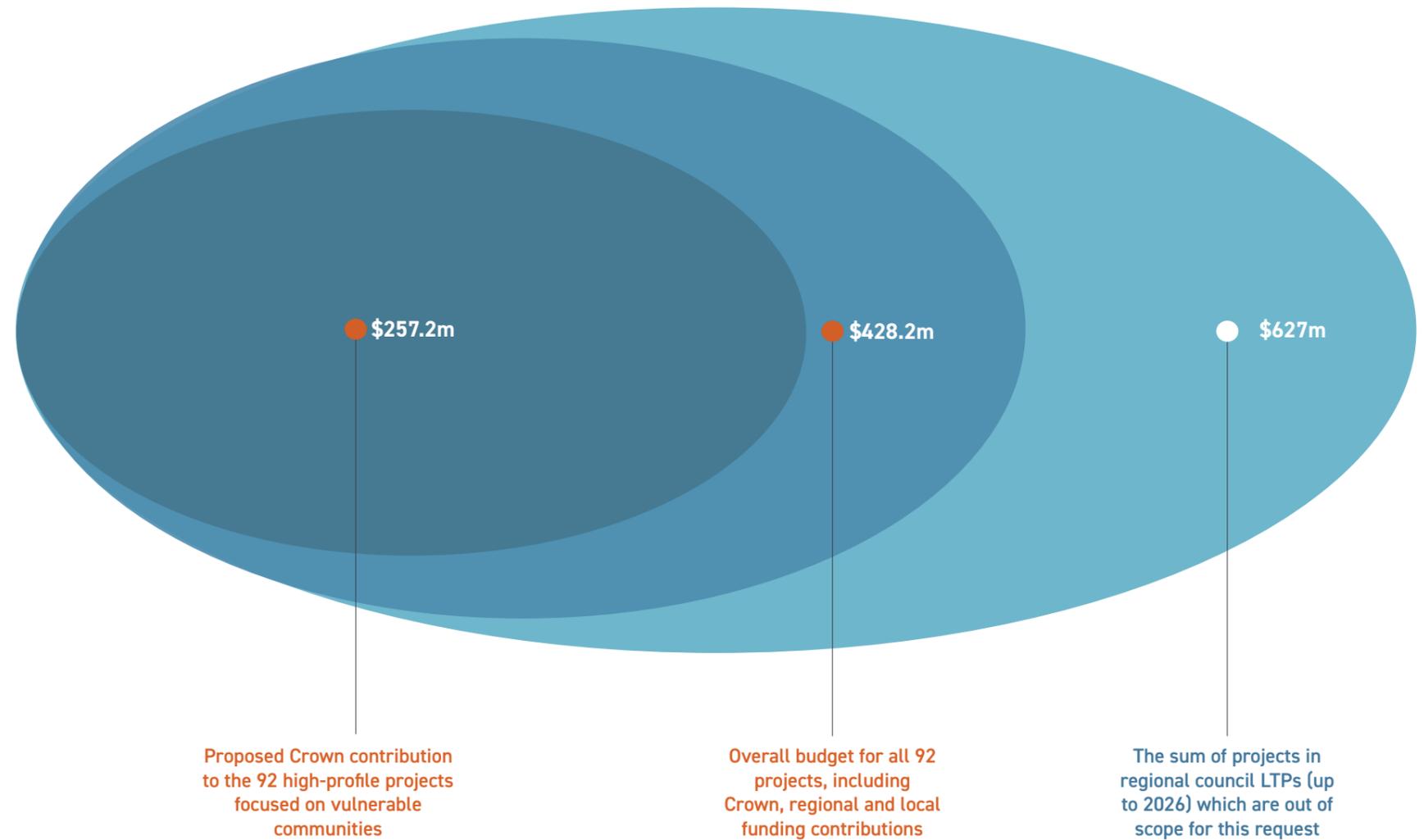


# Investment summary

As noted earlier in the document, our suggested co-investment allocation rate of 75%/60% is based on deprivation and the TA's ability to fund flood protection measures from the regional ratepayer base.

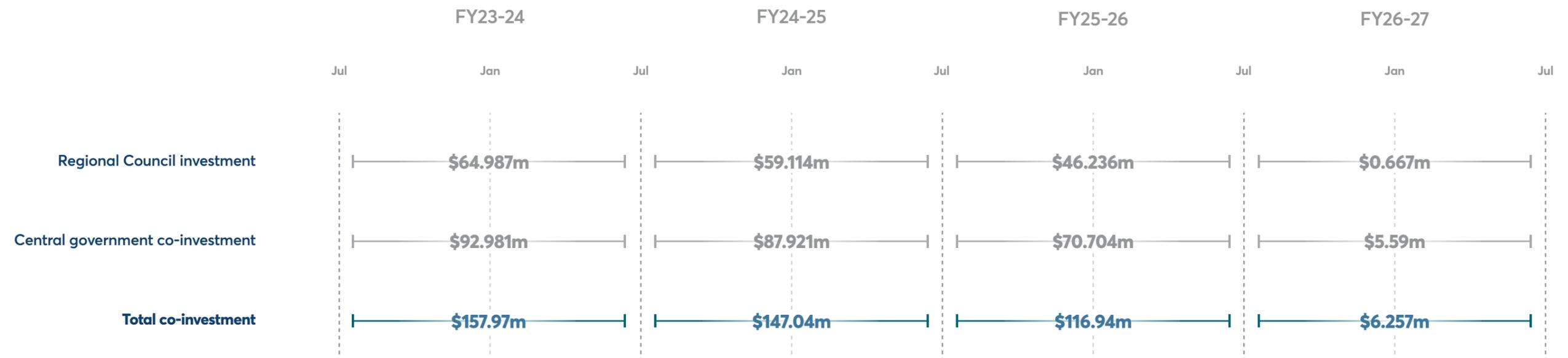
The \$428.2m of capital investment is therefore shared 60% central government and 40% regional councils. As the figure at right shows, the central government investment is \$257.2m (with regional council investment being \$171m). Detailed project-level breakdowns are available in the Appendix.

This is a capex investment. The following pages provide the co-investment rationale and the projected cashflow for the package of projects.



# Summary investment cashflow

The table below shows the capex co-investment for the 92 projects.



- As can be seen, the cashflow is heaviest in the first two financial years and then tapers to a small residual in the fourth year. This reflects the fact that the 92 projects are shovel-ready and can be commenced quickly, with the constraining factor being the availability of capital rather than design or construction capacity.

The cashflow also reflects the fact that most projects will be finished quickly and the outcome of better flood protection for vulnerable communities achieved within a few years of projects commencing. The ability of regional councils to deliver quickly and effectively was demonstrated by the successful completion of the 55 projects funded as part of the post-COVID recovery.

# 5.0

## Implementation approach



# Regional construction pipeline

## The construction pipeline report shows continued strong demand.

The National Construction Pipeline Report 2021 reports that New Zealand's total construction value decreased by 5.7% in 2020 to \$42.6b, showing the impacts from the COVID-19 pandemic. This year's forecast is for construction activity to grow steadily to about \$48.3b in 2024, driven largely by the continued strength of the residential sector. Residential buildings contributed 58% of total construction value in 2020.

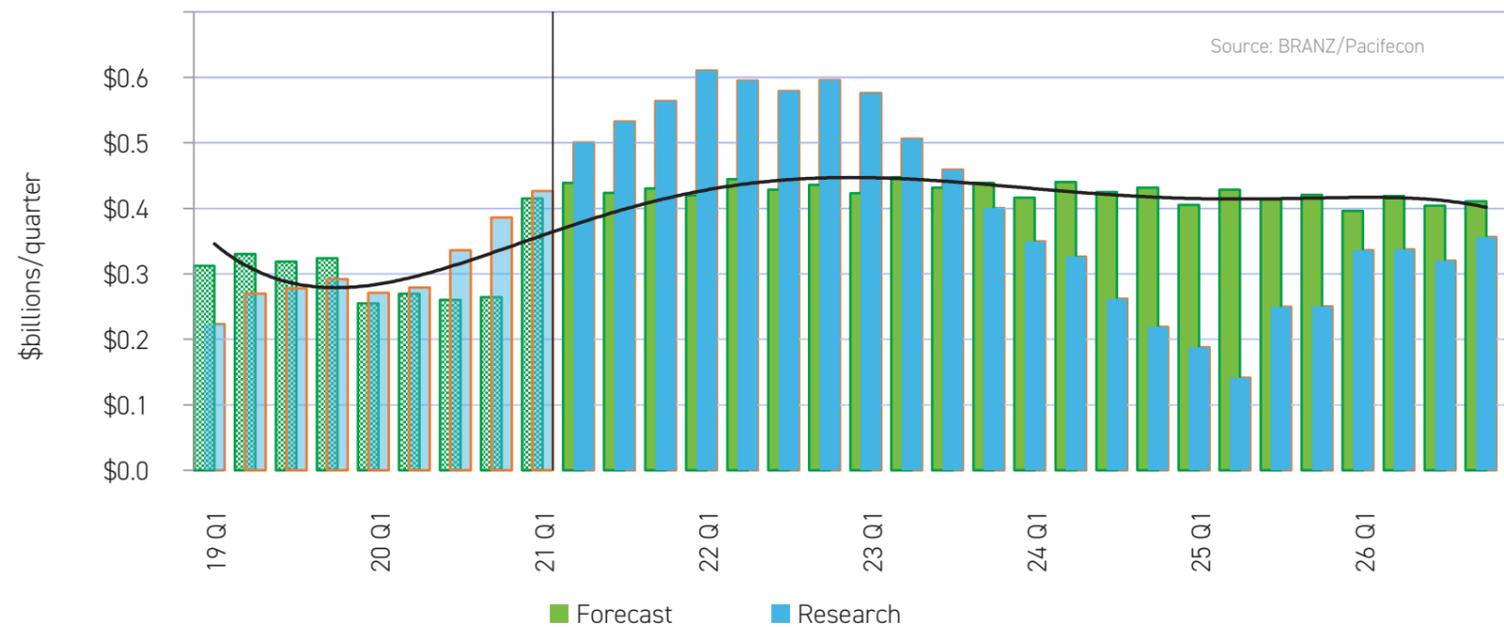
Non-residential building value nationally peaked in 2019 at \$10.2b. However, strong project intentions in the sector remain. The report forecasts activity to reach the 2019 levels towards the end of the research period, with a forecast of \$10.2b in 2025 and \$10.3b in 2026.

Commercial buildings are the most prominent non-residential building work expected to start in the year to December 2021, contributing 47% of the total number of projects and 47% of total value. This is a higher proportion by number than in the 2020 report when many planned visitor accommodation and office building projects were being delayed. These are now being progressed. Education has many projects (24% of the total number of projects) but only accounts for 13% of the total value.

The private sector is the largest initiator of non-residential building, contributing 66% of the value of researched intentions over 2021 to 2026, while central and local government make up 21% and 13% respectively. Compared to last year, central government has decreased its overall share slightly, whilst local government has maintained and the private sector has increased marginally. New non-residential building intentions for all sectors are forecast to peak through 2022.

Central and local government-initiated projects continue to benefit from having good long-term visibility of funding, which means intentions tend to remain strong throughout the forecast period.

The Rest of New Zealand section of the report contains 10 regions – Gisborne,



Hawke's Bay, Manawatu-Whanganui, Marlborough, Nelson, Northland, Southland, Taranaki, Tasman and West Coast. These regions individually all have a lower value of total construction activity and populations than the other regions, but are regarded as an accurate predictor for the likely construction sector capability for the flood protection projects.

For Rest of New Zealand, total construction value reduced by 4% to \$6.4b in 2020, following 10% growth in 2019. Slight growth in residential building of 0.3% was mitigated by an 18% decrease in non-residential building and 2% in infrastructure.

Total construction value for Rest of New Zealand is forecast to increase by 15% to \$7.3b in 2021 and then remain close to that level until 2024, decreasing to \$6.8b in 2026.

The graph above shows the forecast and researched predictions for the growth in non-residential construction in the ten aggregated regions. With construction volumes predicted to continue at robust levels over the next five years, it is likely the flood protection projects will be of interest to engineering and construction companies, based on their likely pipelines.

# Construction cost inflation pressures

## Costs are escalating due to supply chain and logistical issues.

In late 2021 EBOSS undertook a supply chain report for the construction sector, in conjunction with BRANZ. The intention of the report was to quantify the anecdotal supply chain issues being experienced by construction companies, which are in turn impacting projects across the country.

As the report notes, 90% of all construction products sold in NZ are either imported or contain imported components not easily replaced by domestic supply. In this context, logistics and supply chain issues are major determinants of both materials availability and construction costs, particularly given that international shipping costs have risen up to 100% for some categories of product in the last 12 months.

The diagram at right shows the extent of the challenges in key construction product categories, ranging from structural components to interior and finishing items. There are a number of impacts identified in the EBOSS report:

Structural products are suffering from the greatest supply and logistical challenges, increasing costs and lead times for practically all significant projects

Lead times have lengthened significantly since 2019 and are expected to continue to do so, with flow-on effects for project delivery.

In this environment, early decision making on whether or not to proceed with a project and early planning for major construction components is key to working around the ongoing logistical and supply challenges in the industry.

### ● Average price increases by category



**Structure:** Aluminium, Composite Panels for Floors and Walls, Concrete, Fasteners and Connectors, Masonry, Plastics, Site Safety and Roof Access Equipment, Stainless Steel, Steel, Structural Systems, Structural Timber

**Enclosure:** Awnings and Canopies, Enclosure Adhesives, Sealants and Fasteners, Enclosure Balustrades and Stairs, Exterior Decorative Items, Flashings and Expansion Joints, Glazing, Insulation, Roofing and Decking, Tanking and Pre-Cladding, Wall Cladding, Windows, and Doors

**Interior:** Ceiling Systems, Floors, Furniture, Hardware, Joinery Fixtures and Appliances, Partitions and Interior Doors, Signs and Features, Wall, and Ceiling Linings

**Finish:** Applied Coatings, Carpeting, Flooring Ancillaries, Flooring Underlays, Overlay Flooring and Wall Panels, Painting, Decoration and Coating, Resilient Surfacing, Tiling

**External:** Engineering Works, External Heating, Landscaping, Roads and Paving, Stretched Fabric Systems

**Other:** Services, Central Vacuum Systems, Communications and Controls, Fire Safety, Heating and Cooling, Lighting and Electrical, Plumbing and Drainage, Sanitaryware, Tapware, Transport, Ventilation and Air Conditioning

# Project delivery methodology

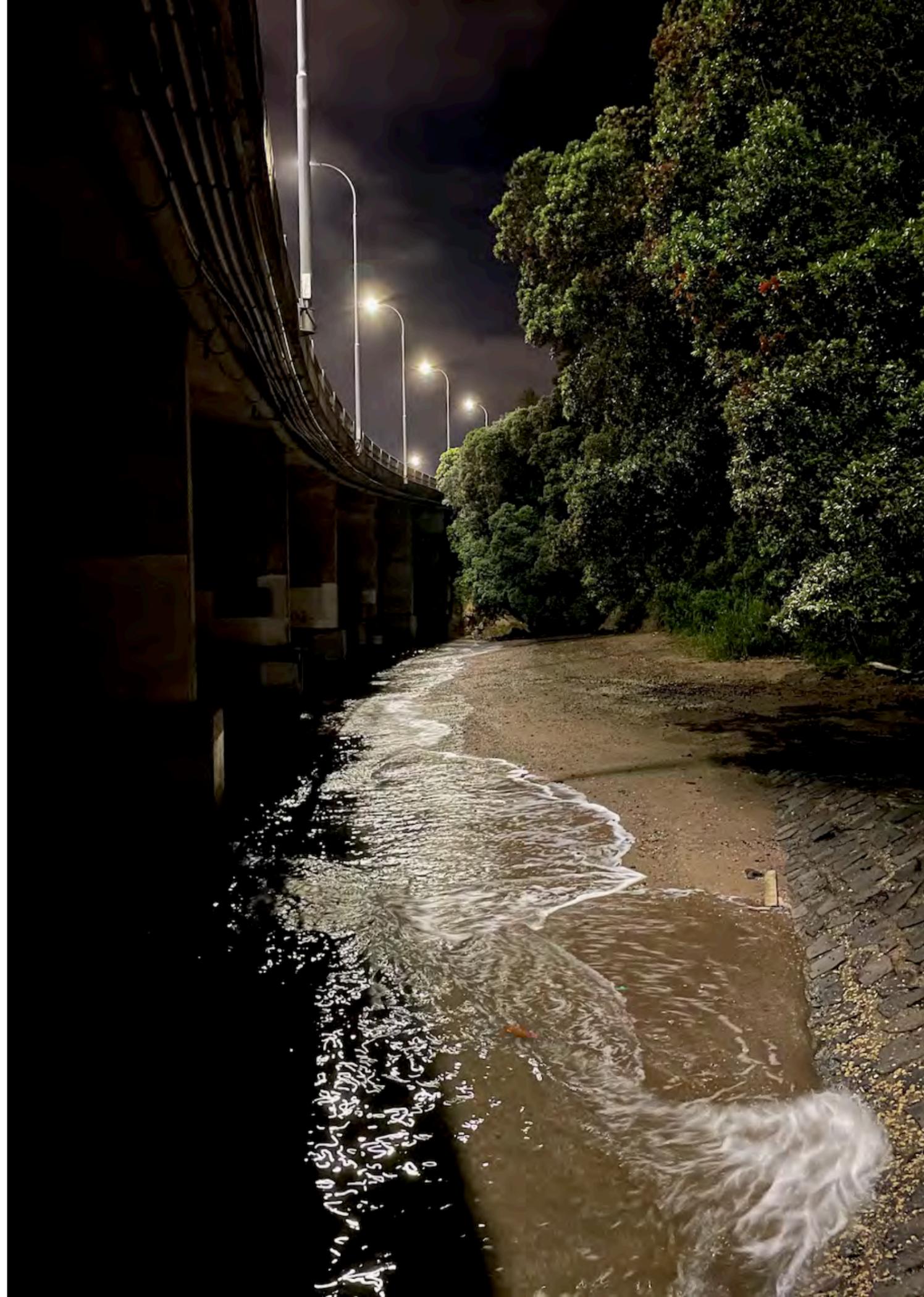
**Robust project management methodologies are used throughout the Regional Council sector.**

As evidenced by the progress reporting on the 55 projects funded previously through Kānoa, regional and unitary councils have demonstrated capability and capacity to deliver on flood protection projects on time and to budget.

Successful delivery is based on the robust project delivery methodologies that have been implemented and refined across the Regional Government sector over the last few decades. While there is variation in some of the specifics, all Regional Councils underpin their ways of planning and delivering projects using standard project management methodologies such as PMI and PRINCE2.

One of the key learnings from the first tranche of projects was the value in building and sustaining specialist teams across the Regional Government sector, focused on flood protection. In establishing these teams, key project delivery, commercial and risk management methodologies were developed and promulgated across the sector. These methodologies – in project delivery, construction pipelining, commercial engagement and negotiation, risk mitigation and others – are serving to de-risk the subsequent tranche of projects detailed in this proposal.

For example, part of the first tranche of delivery involved procuring and establishing a pipeline of construction, engineering, contractor, and other council works for the timely completion of projects. Co-investment in this second tranche of projects will enable us to sustain and capitalise on existing arrangements, and to minimise risks while maximising construction efficiencies.



# The collaborative approach we have taken

## A collaborative partnership with central government is necessary for delivering improved community flood resilience.

Te Uru Kahika is committed to engaging in a collaborative partnership with central government for the delivery of successful community flood resilience and wellbeing outcomes.

The previous co-investment from Kānoa provided the foundation for central and regional government to collaborate and jointly deliver on a range of wide range of benefits beyond flood protection. In particular, the governance mechanisms established through the Advisory Board has thus far proven an effective means of collaborating.

Additionally, the multi-party DIA-supported Community Resilience Steering Group, operating between 2019-2020 provided leadership and set a precedent for a genuine collaborative approach in improving community resilience and adaptation to natural hazard risks and climate change. This group comprised senior central and local government representatives, as well as iwi/mana whenua representatives.

This second tranche of proposed projects will allow us to continue to build on existing collaborative frameworks and work toward instituting a genuine partnership for the essential longer-term programme of work needed.

We will continue to work with central government in collaboratively reaching agreement about the cost apportionment of the co-investment across

projects, based on prioritisation of comparative deprivation.

We see significant benefits in continuing the existing governance and oversight structures for the projects outlined in the current proposal.

It is our intention that a leadership platform for all relevant parties - including regional councils and central government agencies - can be convened for our longer term programme of work. Here, we see significant value in reconstituting the Community Resilience Steering Group, and this forms one of the recommendations of our proposal.

We look forward to working with central Government within the framework of the Steering Group.

## The existing governance arrangements are well placed to provide oversight of projects and benefit realisation.

The governance structures already in place for the Kānoa Climate Resilience programme remain fit-for-purpose in providing oversight for this current programme of work. Specifically, the Climate Resilience Advisory Board was established by the Provincial Development Unit in early 2021 to provide oversight of investment and ensure accountability on behalf of the funders.

Its members comprise a Chairperson, as well as a representative each from the DIA, Kānoa, and River Managers' SIG. In this way, the group represents genuine collaboration between central and regional government; reflecting the aim and intent of the co-investment.

Alongside regular reports provided to the Advisory Board, a review process is also conducted for each council's programme to ensure continuous improvement and successful delivery of outcomes. Progress of project tasks and milestones, as well as other environmental and social procurement outcomes were also tracked.

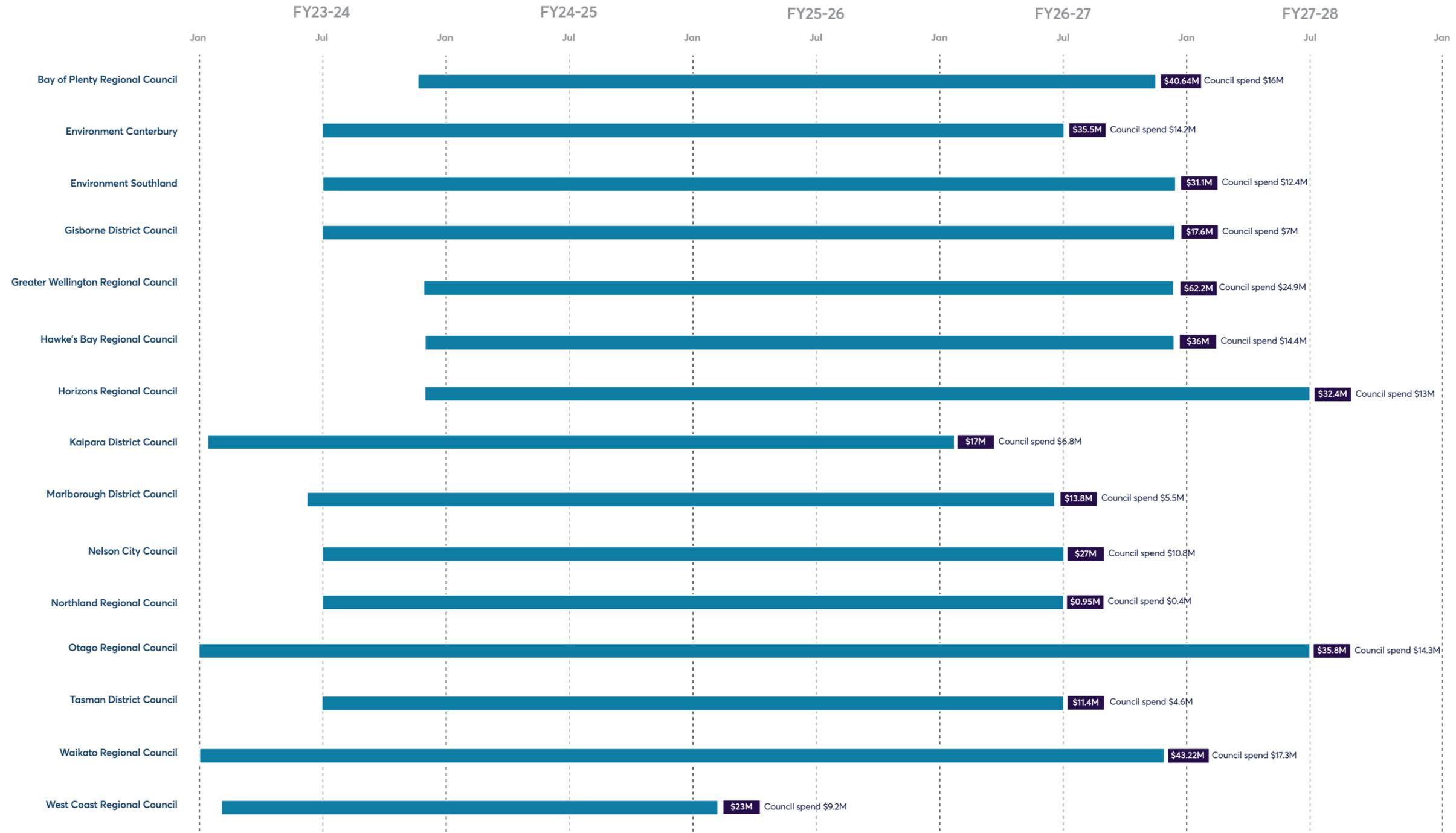
The expertise and institutional knowledge within the Board, along with established risk assessment and reporting frameworks, mean the Advisory Board is best placed to provide oversight of the proposed tranche of projects and their benefit realisation.

Te Uru Kahika is therefore recommending the continuation of the established governance structure for the projects outlined in this proposal.

# The delivery roadmap

An overview of the delivery timeline and spend by Regional Council.

Consolidated overview of Regional Council spend



# Risk management approach

## Project delivery risks will be managed by Regional Councils using their proven methodologies.

As noted above, Regional Councils have an extensive and proven track record of delivering flood protection projects on time and within budget. This was demonstrated anew over the course of the 55 shovel-ready projects approved as part of the Government's post-COVID recovery.

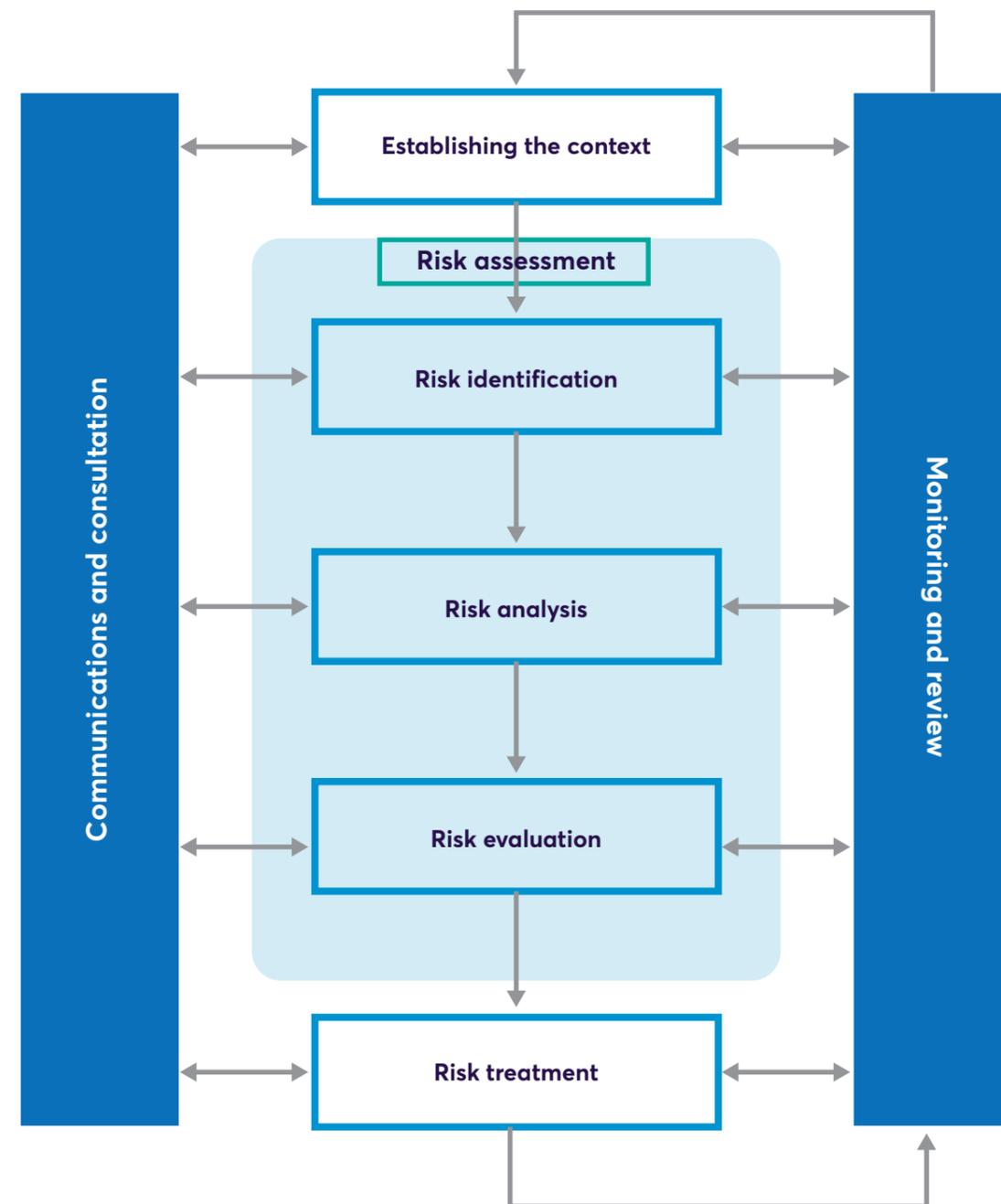
Earlier in the business case the outcome risks were identified; these are the risks that could prevent or reduce the benefits expected from the investment being achieved. At a project level, it is the delivery risks that must be closely managed; these are the risks that can prevent individual projects being delivered on time, within budget, and to the correct scope.

In the current environment, the most significant risks are:

- **Cost escalation pressures**, as noted earlier in this section. Managing project delivery within budget in an environment of high construction cost inflation is challenging and will require careful management by Regional Council teams.
- **Construction capacity constraints**, which are particularly acute in some regions and specific sectors. These constraints are likely to be a primary driver of delays to projects, but have only a limited number of mitigations.
- **Capability shortfalls** can be a challenge in specific projects where highly specialised skills are necessary, which can in turn lead to bottlenecks in delivery.

Successful project delivery is closely linked to effective risk management, and Regional Councils have proven methodologies and robust processes for risk assessment, mitigation and management. While the detail of the processes varies across the country, a consistent approach to risk management is used, as illustrated in the diagram at right.

Risk management is a core component of standard Regional Council project management methodologies, and risks are routinely assessed at project, programme and governance levels, and appropriate actions taken. Based on the extensive track record across the shovel ready projects, there is every reason to expect Regional Councils to manage risks effectively for this programme of work.



# 6.0

## Recommendations and next steps



# Recommendations

**It is recommended that government proceed with co-investment as a matter of national interest.**

As evidenced throughout business case, considerable work has been done over the last few years to assess and quantify the risks across our current flood protection schemes, as well as the investment approaches needed to address these.

In particular, we have highlighted the inequities in the current funding approach and its inability to remain a sustainable funding model in the long-term. We have also demonstrated there is significant national interest in flood protection and resilience - in terms of its wellbeing and fiscal impacts, as well as through the protection of vital Crown assets and infrastructure.

The current proposal builds on the analysis and co-investment pathways already established between central government and Te Uru Kahika. It sets out an immediate prioritisation of flood protection works, along with a pragmatic roadmap for flood resilience over the next few decades.

We therefore recommend that central government:

1. Approve the \$257.2 million request for co-investment in a three-year delivery programme for 92 additional flood protection projects, and
2. Sustain the existing governance arrangements (Advisory Board) under the Resilient River Communities banner for the proposed tranche of projects

The indicative co-investment rates and amount are consistent with what has been funded through the previous Kānoa Covid Recovery Programme, albeit with local government contributing at a higher rate. However, the continuation of shovel-ready funding is unsustainable for developing our flood resilience long-term.

In order to develop a comprehensive national model of flood resilience, we recommend that central government:

3. 4. Work with Te Uru Kahika to invest in and implement a longer-term programme of work including developing a sustainable co-investment model and a national PARA (multi-tool) assessment model
4. 5. Re-convene the Community Resilience Steering Group to provide leadership and a consolidated steer on future community flood resilience recommendations.



# Appendix

# 7.0



# Detailed project listings

Council	Territorial Authority (TA)	Project Name	Project Description	Project Total Cost (\$m)	Project Start Date	Project duration	IMD Rank
Northland Regional Council	Far North District	Kawakawa Deflection Bank	Deflection Bank and raising bridge deck to spill water on flood plain	0.55	2024	2	4801
	Far North District	Matangirau Flood Risk Reduction Phase 2	Restoring the flow of the Towai Stream that has been blocked by Wainui Road Causeway	0.36	2023	2	4801
Kaipara District Council	Kaipara District	Dargaville to Te Kopuru Stopbank Upgrade	Reconstructing the existing 11km of stopbank between Dargaville and Te Kopuru to protect against a 1 in 100 year flood event	12.00	2023	3	3998
	Kaipara District	Raupo Floodgate Canal K	Installation of a new floodgate structure at the mouth of K canal, supporting the G canal floodgate project funded in the current tranche of the climate resilient program	5.00	2023	2	3998
Auckland City Council		No projects put forward					
Waikato Regional Council	Waikato District	Lower Waikato Stopbank Upgrade	Work involves stopbank renewal, through increasing crest level height to design standard across Lower Waikato zone	8.70	2023	3	3725
	Hauraki District	Mid Piako River Emergency Flood Ponding Zones Upgrade Hauraki Plains	Part of a multi-year overall package including 26km of stopbank upgrade. Includes earthworks construction of stopbanks back to design height as part of normal stopbank lifecycle maintenance.	5.40	2023	3	4622
	Waikato District	Rangiriri Fish Passage Pumps	Replacement of the existing flood protection pump station (including pumps) to maintain the required level of flood protection. This is a continuation of the MBIE funded Shovel Ready Fish Passage Project.	4.00	2023	2	3725
	Waikato District	Island Block Fish Passage Pumps	Replacement of the existing flood protection pump station (including pumps), an aged asset and within a priority catchment for tuna. This is a continuation of the MBIE funded Shovel Ready Fish Passage Project.	2.80	2024	2	3725
	Hauraki District	Pipiroa Stopbank Piping Failures Repairs	Prevention of catastrophic failure of existing flood protection infrastructure and maintaining current level of flood mitigation service on an at risk/compromised asset experiencing piping.	1.10	2023	3	4622
	Hauraki District	Kirikiri Stopbank Upgrade - Kopu Thames Connection	"Upgrade of stopbanks to level of service due to subsidence. Multi-agency project involving input from NZTA to upgrade the SH26 bridge to the Scheme flood risk level, and protection of iwi owned land and archaeological sites."	5.10	2023	3	4622
	Hauraki District	Thames Valley Division Channel Planting and Maintenance Programme	Flood mitigation channel planting promoting sustainable asset management and diversion channel management practices. Programme includes fencing, drain shaping, and planting of smaller drainage channels to reduce maintenance requirements and enhance instream and riparian ecological values.	1.80	2023	3	4622
	Hauraki District	Piako River Accommodation: Ngatea right stopbank	Improving the capacity of the highest risk stopbank in the Piako River Scheme and lowering the need for future stopbank upgrades because of decreased pressure on the remaining assets space for the river. Final piece of work continuing on from the successful upgrade part of the MBIE funded Ngatea Left Stopbank Shovel Ready project and connects with the MBIE funded Johnstone's Fish Passage Pump upgrade.	0.58	2023	3	4622
	Thames-Coromandel District	Erosion and Flood Prone Rivers Streams and Stream Mouths Coromandel River Catchments - Flood Resilience Improvements	Removing obstructions and reducing sediment loss from eroding banks to minimise the flood risk to properties and infrastructure to the benefit of the river catchment	2.80	2023	3	3593

# Detailed project listings

Council	Territorial Authority (TA)	Project Name	Project Description	Project Total Cost (\$m)	Project Start Date	Project duration	IMD Rank
	Waikato District	Mangatawhiri Pump Station Infrastructure	Replacing aged dual inlet at the pump station and the construction of an isolation gate enabling access to the pump for maintenance	0.54	2024	1	3725
	Waikato District	Tuakau Pumpstation Infrastructure	Replacing Tuakau Pump Station inlet and pipes	0.40	2023	2	3725
	Waitomo District	Erosion and Flood Prone Rivers in the Waikato, Waipa and West Coast River Catchments - Flood Resilience Improvements	Flood mitigation from remediation of active erosion and prevention of further significant erosion in high priority rivers.	5.00	2023	3	4219
	Waikato District	Lower Waikato Floodgate Upgrade Programme	Initial flood mitigation projects will be assets to the east of Huntly in the Mangawara catchment (Mangawara River, Sludge Creek, Pouarauroa Stream)	2.00	2023	3	3725
	Hauraki District	Firth of Thames and Waihou Sediment Trap Digs - Sediment Removal	Flood mitigation sediment trap digs in preparation for future stopbank upgrades (material requires 3 years of drying before it is useable for construction) plus removal of built up sediment from silt traps. Project includes renewal of river side fences that are due for replacement.	3.00	2023	3	4622
<b>Bay of Plenty Regional Council</b>	Ōpōtiki District	Waioeka Otara Rivers Scheme Stopbank Upgrades	Upgrade existing stopbanks to meet 1 in 100 year event levels of service and provide for climate change	1.84	2023	1	5321
	Whakatāne District	Project Future Proof 2023-26 Whakatane-Tauranga Rivers Stopbanks and Floodwalls Upgrade	Upgrade existing stopbanks and floodwalls to meet 1 in 100 year levels of service and provide for climate change	16.50	2023	3	4322
	Whakatāne District	Whakatane Canals Stopbank & Trident Stopbank Upgrade	Upgrades of Whakatāne Canals and Trident stopbanks	5.90	2023	2	4322
	Taupō District	Rangitāiki Tarawera Rivers Scheme Stopbank Upgrades	Tarawera River, Rangitāiki River and Rangitāiki Drainage Schemes Stopbank Upgrades	3.40	2023	3	3248
	Western Bay of Plenty	Kaituna Catchment Control Scheme Floodpumps and Stopbank Upgrades	Upgrade flood protection for Te Puke Township and wider Kaituna catchment with upgrades and installation of permanent pump stations as well as stopbank upgrades.	13.00	2023	2	2933
<b>Gisborne District Council</b>	Gisborne District	Waipaoa River Flood Control Scheme Climate Resilience Stopbank Strengthening Western side Project	Strengthening (stopbank raising & widening work) to the remaining 31km of stopbanks located along the western side of the Waipaoa River	12.00	2023	3	4480
	Gisborne District	Tokomaru Bay Mangahauini & Waiotu Rivers Flood Protection Climate Resilience Project	Strengthening of existing stopbank of 800m (LB), a new stopbank at a gap of 100m (LB) and a 800m new stopbank/flood wall at the RB at Mangahauni River scheme. Also a new stopbank / flood wall of 700m (RB) at Waiotu Stream along SH35.	2.80	2023	2	4480
	Gisborne District	Makarika School Flood Protection Climate Resilience Project - Ruatoria	Strengthening (stopbank raising & widening work) of an existing stopbank of 700m (LB), a new stopbank at a gap of 400m (LB) at Makarika River scheme	2.80	2023	2	4480
<b>Taranaki Regional Council</b>		No projects put forward					
<b>Horizons Regional Council</b>	Horowhenua District	Foxton Flood Mitigation Project - Tranche 2	Mitigating flooding caused by overtopping and seepage through the existing embankments by providing some detention of runoff on farmland to the east of the township.	12.70	2024	3	4627
	Whanganui District	Te Puwaha - Lower Whanganui Training Structures South Mole	Building resilient communities through lower river training structures which maintain the current river channel alignment at the mouth of the river and protect critical infrastructure from erosion and sea encroachment,	13.20	2023	2	4383

# Detailed project listings

Council	Territorial Authority (TA)	Project Name	Project Description	Project Total Cost (\$m)	Project Start Date	Project duration	IMD Rank
	Palmerston North City	Rangitikei River Enhancement Project - Tranche 2	Enhancing the Lower Rangitikei River by restoring natural processes and reducing the risk of flooding and erosion, with the long-term vision of re-creating a resilient and sustainable river corridor.	2.50	2024	3	3519
	Palmerston North City	Lower Manawatu and Palmerston North Climate Resilience Project - Tranche 2	Tranche 1 involved the targeted construction and upgrading of flood protection works within the Lower Manawatu and Palmerston North Climate Resilience Projects. Tranche 2 will combine these projects to allow future project works to be prioritised based on risk, consequence and deliverability, without the need to move funding between projects.	4.00	2024	3	3519
<b>Hawke's Bay Regional Council</b>	Hastings District	Heretaunga Plains Flood Control Scheme Stopbank Upgrade - Ngaruroro and Tukituki Rivers	Upgrading of 30km of stopbanks on both sides the upper section of the Ngaruroro and lower section of the Tukituki rivers, raising the flood protection level from 1:00 to 1:500, as a follow-on from current work in the Ngaruroro River	30.00	2023	3	3535
	Hastings District	Upper Tukituki River Gravel Extraction - Tranche 2	Removal of up to 2,000,000m3 of gravel from the upper section of the Tukituki river system.	4.00	2023	3	3535
	Napier City	Wharerangi Stream Erosion Control Project	Installation of 25m long x 3m deep of rock rip rap bed protection, contouring along a 15m vertical height waterfall which is eroding and undermining upstream bed material.	2.00	2024	2	3390
<b>Greater Wellington Regional Council</b>	Masterton District	River Road Masterton Flood Protection Upgrade	Completion of the final stage (stage 3) of the River Road, Masterton required project work through construction of 11 river protection groynes.	4.30	2023	3	3939
	Masterton District	Masterton Water Supply Protection Project	Protect Masterton District Council's raw water supply pipeline on the Waingawa River by constructing three rock groynes.	0.54	2023	1	3939
	Masterton District	Waipoua River SH2 Left Bank Protection Upgrade	Flood protection construction of a new rock revetment to protect SH2 bridge abutment as well as the walking/cycle trail.	0.11	2023	3	3939
	Masterton District	Waipoua Industrial Site - Akura Road Edge Protection Project	Edge protection as a result of significant erosion of river-bank into industrial property, protecting Masterton's mains water supply pipe	2.21	2023	3	3939
	South Wairarapa District	Greytown Flood Protection Waiohine River Plan	Construction of two stopbanks both 800m long: one on North Street and one on Kuratawhiti Street.	8.04	2023	3	2565
	South Wairarapa District	Fullers Bend Protection - Greytown	Upgrade of Fullers Bend flood erosion protection with construction of a new rock revetment.	2.95	2023	3	2565
	Upper Hutt City	Pinehaven Streamworks Project, Upper Hutt	Improving the level of flood protection for the Pinehaven community by increasing the capacity of the Pinehaven Stream to prevent flooding up to a 1 in 25-year return period event. Project includes two elements, Phase 1: replacement culverts in Sunbrae Drive and Pinehaven Road and Phase 2: increasing the stream capacity.	14.30	2023	3	3200
	Upper Hutt City	Gemston Drive Flood Protection, Upper Hutt	Improving flood protection for residential properties through the construction of groynes along the true right bank of Te Awa Kairangi and the construction of a rock revetment along the true left bank.	4.69	2023	3	3200
	Masterton District	Rathkeale College Protection, South Wairarapa	Stopbank upgrade to protect neighbouring school	2.01	2023	3	3939
	Kapiti Coast District	Otaki Cliffs River Bank Protection	Improved flood protection flows by construction of 21 groynes to protect a 50m river bank vertical bank, and provide permanent works to prevent the need for on-going bulldozer channel works.	14.70	2023	3	3095

# Detailed project listings

Council	Territorial Authority (TA)	Project Name	Project Description	Project Total Cost (\$m)	Project Start Date	Project duration	IMD Rank
	South Wairarapa District	Tawaha and Awaroa Floodway Spill-over-sill Update, South Wairarapa	Upgrade spill-over sill into Tawaha floodway through rock protection and realignment of sills. Also includes vegetation removal, survey, and levelling.	0.34	2023	3	2565
	South Wairarapa District	Pukio East Stopbank Realignment, South Wairarapa	Final stage of stopbank realignment	0.47	2023	3	2565
	South Wairarapa District	Floodgates and Pump Station Upgrades, South Wairarapa	Upgrades to existing river infrastructure at approximately 15 floodgates and 5 pump stations to include improved fish passage.	0.80	2023	3	2565
	Carterton District	Flood Protection Upgrade Buffer Riparian Planting, South Wairarapa	Planting of the buffers/riparian as per the Te Kāuru FMP	2.68	2023	3	2728
	Masterton District	Eastern Rivers Flood Protection Upgrade, South Wairarapa	Reduce flood event damage by improving river flow through the removal of crack willow and planting, fencing and pest control to stabilise banks and reduce sediment on the Kopuaranga, Taueru and Whangaehu Rivers. Planting will also reduce run-off from farmland, improving water quality.	4.02	2023	3	3939
	Upper Hutt City	Poet's Park Development, Upper Hutt	Final stage of works required for a two-stage project that was started in 2020 with the first tranche of Climate Resilience Flood Protection funding. Second stage involves additional design and landscaping elements such as seating, signage, Te Ao Māori focused artwork, etc.	0.67	2023	3	3200
<b>Nelson City Council</b>	Nelson City	Nelson Floods Repairs Risk Protection	Work includes channel capacity reinstatement, scour protection for river and stream banks, grade control reinstatement / upgrade, and fish passage	7.50	2023	3	2911
	Nelson City	Maitai Flood Management Project	Work includes scour protection for urban river banks/ stopbanks, stopbank improvements, channel capacity reinstatement, flood way and channel upgrade in planned urban growth area, and upgrades of minor bridge and tributary intake.	6.00	2023	3	2911
	Nelson City	Jenkins Stream Flood Protection	Work includes stopbank along Jenkins Creek (adjacent Trent Drive), stopbank improvements downstream of Pascoe Street, and channel capacity reinstatement	4.50	2023	3	2911
	Nelson City	Brook Stream Catchment Improvements	Work includes scour protection for urban river banks/ stopbanks, channel capacity reinstatement, grade control reinstatement / upgrade, concrete channel re-lining, fish passage, and tributary intake upgrades	3.00	2023	3	2911
	Nelson City	Todd Valley/The Glen Catchment Upgrade	Work includes secondary flowpath improvements to protect residential property, scour protection for urban stream banks, stream culvert upgrades, gravel traps, channel capacity reinstatement, wetland area restoration / inanga habitat project, and stream stopbanks	3.00	2023	3	2911
	Nelson City	Oldham Creek Upgrade	Work includes scour protection for urban stream banks, channel capacity reinstatement and potential realignment, and stream intakes improvement	3.00	2023	3	2911
<b>Tasman District Council</b>	Tasman District	Lower Motueka River Stopbank Refurbishment	To complete refurbishment of all the Lower Motueka River Stopbanks, building on an initial stage of Kānoa co-funded project work	10.00	2023	3	2517
	Tasman District	Peach Island Stopbank Repair and localised refurbishment	Stopbanks around Peach Island to be brought up to a climate resilient condition and to protect them from further damage	1.40	2023	1	2517
<b>Marlborough District Council</b>	Marlborough District	Renwick Lower Terrace Flood Protection	Construction of new flood relief culvert and replacement structures impeding channel flow	2.00	2023	3	2449
	Marlborough District	Lower Wairau River Flood Capacity Upgrade	Construction of upgraded stopbank (1 in 100 yr) and new rock armouring, enabling future managed retreat and stopbank upgrade	4.70	2024	2	2449

# Detailed project listings

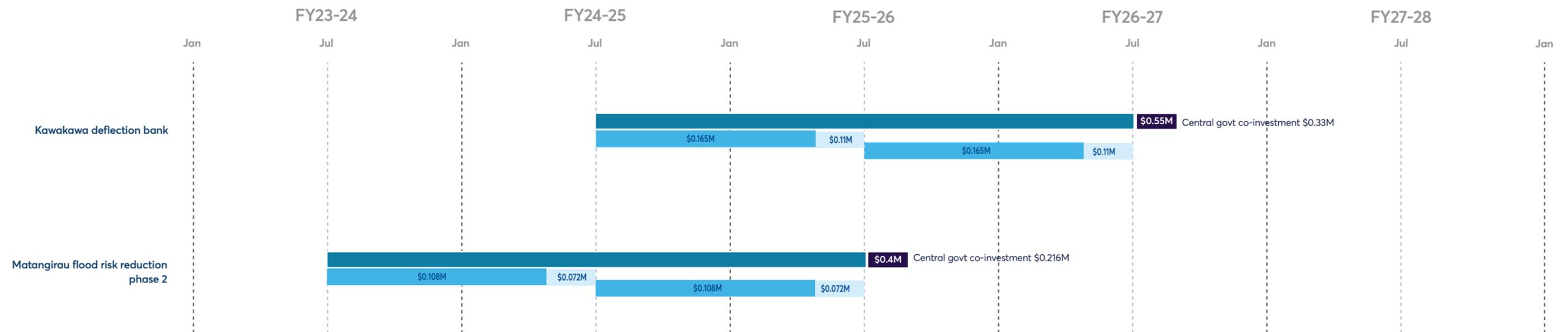
Council	Territorial Authority (TA)	Project Name	Project Description	Project Total Cost (\$m)	Project Start Date	Project duration	IMD Rank
	Marlborough District	Wairau River Flood Protection Scheme	Construction of new intermediate groynes, new riparian planting, and extension of rock armouring	4.50	2023	3	2449
	Marlborough District	Lower Opaoa Flood Protection	Construction of upgraded stopbank (1 in 100 yr)	2.60	2023	3	2449
Environment Canterbury	Ashburton District	Region wide Flood Recovery & Resilience Programme	Stopbank build, rebuild, relocation, retreat, various river works, gravel removal, rock, planting including nursery development, investigations and land purchase	20.00	2023	3	2314
	Timaru District	Waitarakao/Washdyke/Seadown	Investigations, drain relocation/retreat, stopbank rebuild, wetland creation/enhancement, planting	2.00	2023	3	2641
	Waimakariri District	Region wide Planting and Berm Transition #2	Planting, weed control, wetland enhancement. Expansion and continuation of existing highly successful programme of work	4.00	2023	3	2204
	Timaru District	Rangitata Flood & Resilience #2	Investigations, land purchase, stopbank build, rock, diversions and river works, planting, wetlands. Expansion and continuation of existing highly successful programme of work.	3.00	2023	3	2641
	Timaru District	Culvert Weir, Floodgate, Waihao Box Capital Upgrade Programme	Investigations, monitoring, capital upgrades, fish passage enhancements	2.50	2023	3	2641
	Waimakariri District	Fairway Vegetation Clearance Programme	Vegetation spraying and mechanical removal in the fairway, primarily alder and willow	2.50	2023	3	2204
	Christchurch City	Halswell/Huritini & Te Waihora Catchment Drain/Waterways Planting & Initiatives	Planting to shade drains, pest tree removal, wetland enhancement, drain adaptation/improvement, improved water retention, access and other values	1.50	2023	3	2831
West Coast Regional Council	Westland District	Hokitika River Floodwalls	Stage 3: Flood Protections walls to the Hokitika River from mouth to Dairy factory and at Kaniere	2.00	2023	1	3032
	Westland District	Wanganui new riverwall	Construction of new riverwall at location of existing breach to prevent additional scouring and eventual progression of erosion towards the nearby State Highway No. 6 including adjacent power and communication services. Identification of at risk riverbanks to the southern reaches and installation of new riverbanks including modification of existing floodwalls and drainage paths to mitigate impacts from riverine flooding while working alongside river and coastal processes.	7.00	2023	2	3032
	Westland District	Waiho River North Side (Stage 2)	Reduce the flood risk and increase level of flood protection	10.00	2023	1	3032
	Grey District	Cobden Seawall	Protection of the mouth of the Grey River, Cobden residential area, gateway to Elizabeth Point and North Beach	4.00	2023	1	3896
Otago Regional Council	Dunedin City	Henley Bund - Taieri River	Settlement in the crest level of the low floodbank that protects Henley township from the Taieri River allow water to prematurely overflow the bank, and into the township.	1.00	2023	2	2791
	Dunedin City	Middlemarch Flood Resilience	Flood and hazard mitigation for the Central Otago township of Middlemarch	2.00	2023	3	2791
	Dunedin City	Continuation of Contour Channel (West Taieri) Resilience Upgrade	Having completed stages 5 -10 of this project under the climate resilience fund, ORC is now seeking to complete reconstruction for the remaining length of the floodbank, stages 11+. The scope would be similar to the previous stages with the reconstruction of higher and wider floodbanks and associated asset renewals, including up to 3 bridges.	8.00	2023	3	2791
	Dunedin City	Outram Floodbank Safety Upgrade	Preliminary work is underway to establish the structural integrity of the floodbank that protects the Outram township to the west, with remediation options needing to be considered. Additional work is also underway to hydraulic model the failure mechanism and establish/quantify what the risk is to the township of Outram.	5.00	2023	3	2791

# Detailed project listings

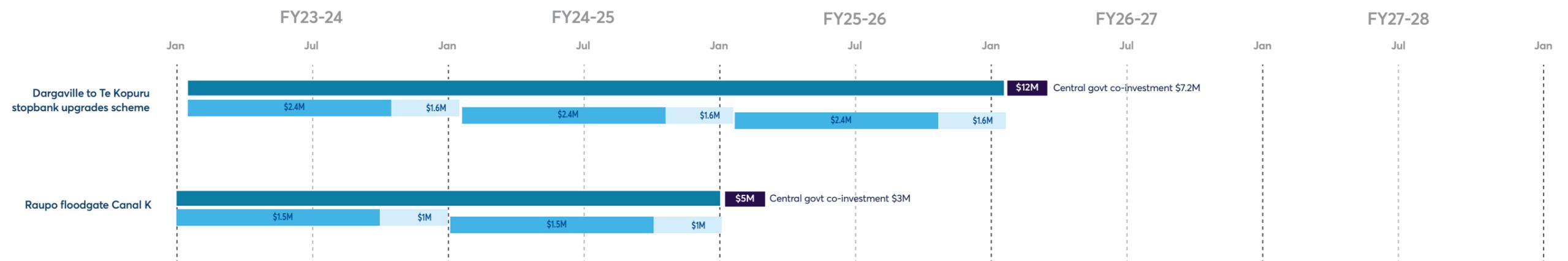
Council	Territorial Authority (TA)	Project Name	Project Description	Project Total Cost (\$m)	Project Start Date	Project duration	IMD Rank
	Clutha District	Balclutha Township Relief Wall Replacements	Assessment and replacement/repair of relief wells on the landward side of the floodbank that protects Balclutha.	2.50	2023	3	2813
	Dunedin City	Silverstream Pump Station Condition & Environmental Improvement	Completing a thorough investigation into the cause of identified seepage issues and implementing solutions to mitigate the risk of floodbank failure, also provides the opportunity to assess and implement fish passage options for this site.	1.80	2023	3	2791
	Dunedin City	Taieri/Waipori Confluence Minibank Repair	ORC is currently reviewing options for repair or potential replacement of this section of floodbank on an alternative alignment. This brings with it the opportunity to consider and implement environmental enhancements in this area, with the potential to create and/or enhance existing wetlands (regionally significant) nearby.	1.50	2023	1	2791
	Dunedin City	East Taieri Lower Pond Gravity Floodgates	Replacing the gabion headwalls, culvert and gravity gates to ensure ongoing structural integrity.	1.50	2023	2	2791
	Dunedin City	Kaikorai Stilling Basin Resilience and Environmental Enhancement	Replacement of stilling basin on the Kaikorai Stream that was significantly damaged in the 2017 flood, to restore its functionality and better enable fish passage past this structure.	2.00	2024	3	2791
	Central Otago District	Roxburgh Flood Resilience	Flood and debris flow mitigation for the central Otago township of Roxburgh.	1.50	2023	3	1217
	Clutha District	Clutha Delta Split Lagoon Environment Enhancement	Installation/modification of the split lagoon culvert to improve its operational and flow control and better facilitate fish passage through the lagoon. Works also need to consider ongoing blockage issues at this location.	2.50	2025	2	2813
	Clutha District	Puerua Outfalls Culvert (Training Line)	Upgrade/modification to culvert system following storm damage in 2020 flood event	1.50	2024	2	2813
	Dunedin City	North East Valley (Lindsay Creek) Flood Resilience	Regular flooding in Lindsay Creek have caused damage to properties through bank erosion and from floodwater overtopping the river banks.	2.00	2023	3	2791
	Dunedin City	Leith Amenity to Sea	Upgrading (long overdue) the stretch of the Leith between Forth St and the harbour (approximately 800m long) to better align with the upstream improvements and surrounding area.	3.00	2024	3	2791
<b>Environment Southland</b>	Gore District	Mataura River Flood Protection Upgrade Project	Increasing resilience across FPS for Southland's 2nd largest population.	18.00	2023	3	3044
	Invercargill City	Invercargill City Flood Protection Scheme Upgrade	Raises and strengthening stopbanks and increasing capacity in the river channel, property purchase of 62 Ha for ponding and detention dam, and completion of the Stead Street pump station upgrade.	11.00	2023	3	3395
	Southland District	Oreti River Catchment Flood Protection Upgrade Project	Oreti FPS upgrade Stage One	0.80	2023	2	1879
	Southland District	Aparima Catchment Flood Protection Scheme Upgrade	Restoring the banks to 1:20 LOS from 1:17, and preparing the banks for future increase in height as 2nd stage projects.	0.50	2023	2	1879
	Southland District	Te Anau Basin Catchment Flood Management Project	Improving the Te Anau Catchment floodplain capacity by upgrading floodbanks to offset the effects of climate change including bioengineering controls.	0.30	2023	1	1879
	Southland District	Makarewa Catchment Flood Management Project	Improving flood plain capacity by removing aging pest trees, pest weed build ups etc.	0.50	2023	1	1879

# Delivery timeline by council

## Northland Regional Council project list

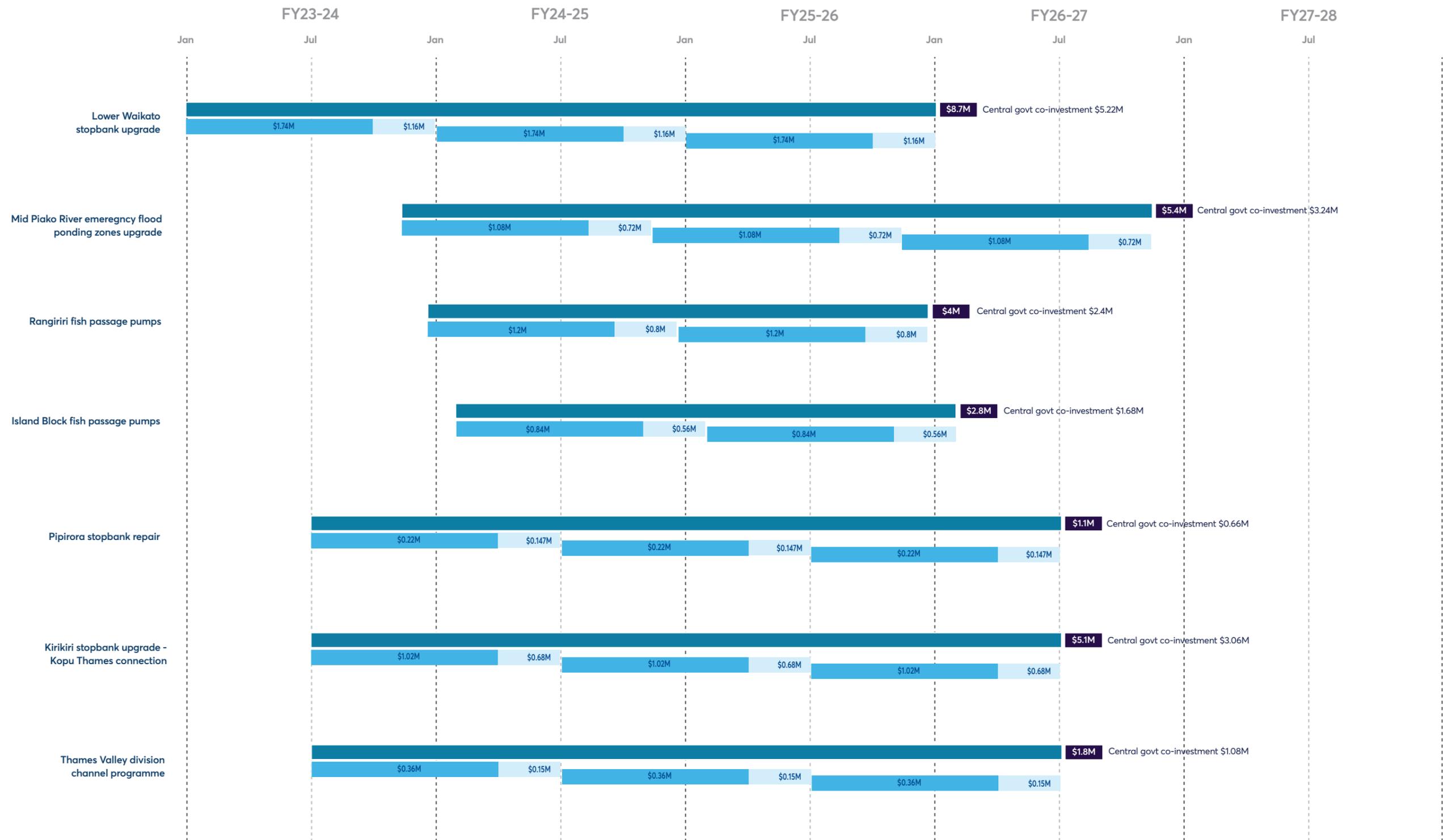


## Kaipara District Council project list



# Delivery timeline by council

Waikato Regional Council project list (1 of 2)



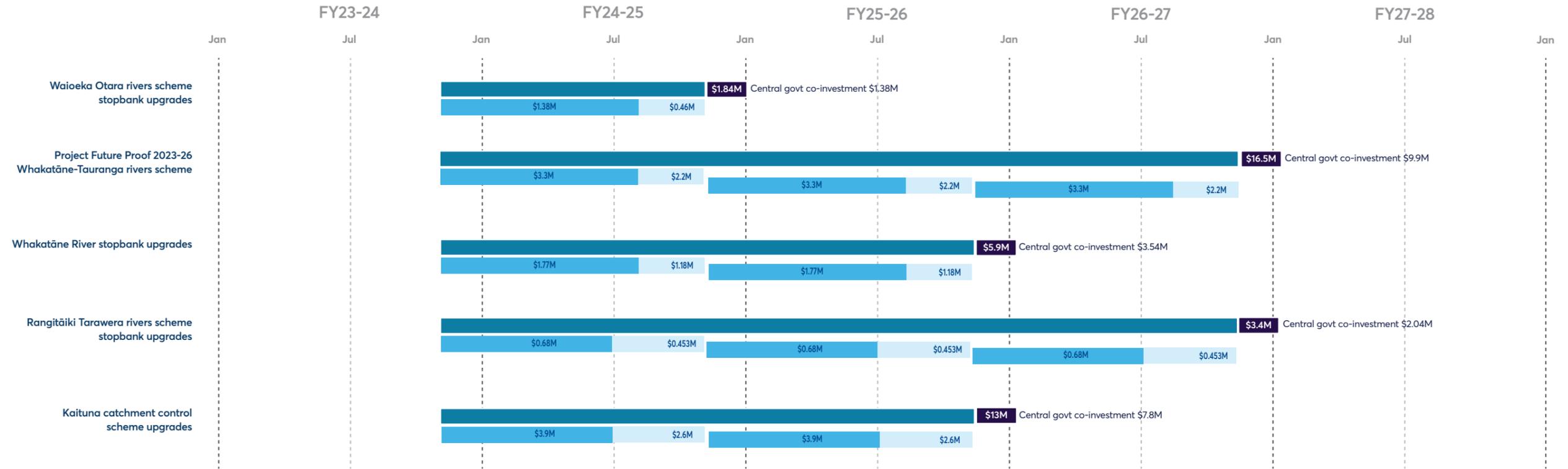
# Delivery timeline by council

Waikato Regional Council project list (2 of 2)

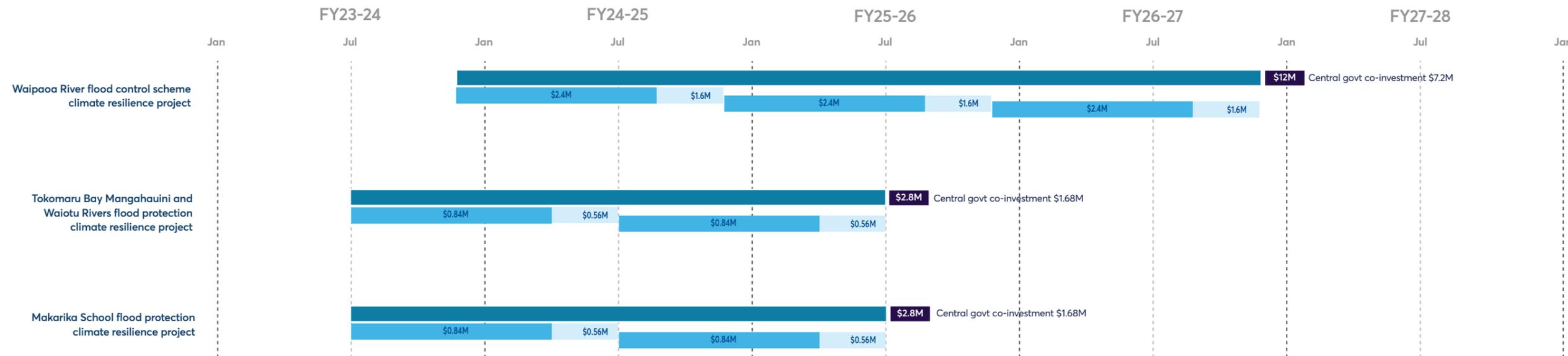


# Delivery timeline by council

## Bay of Plenty Regional Council project list

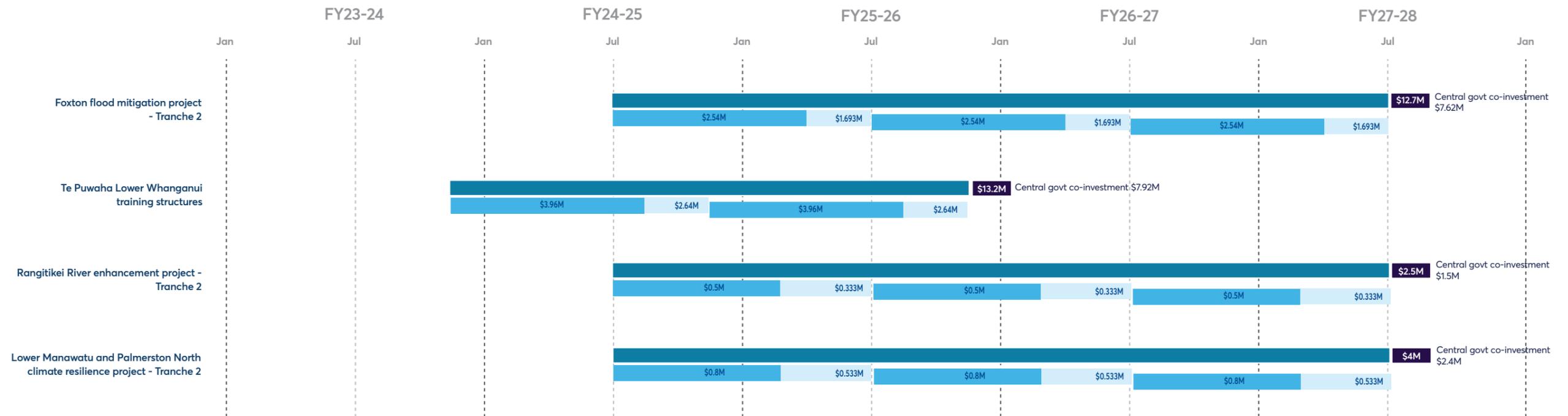


## Gisborne District Council project list

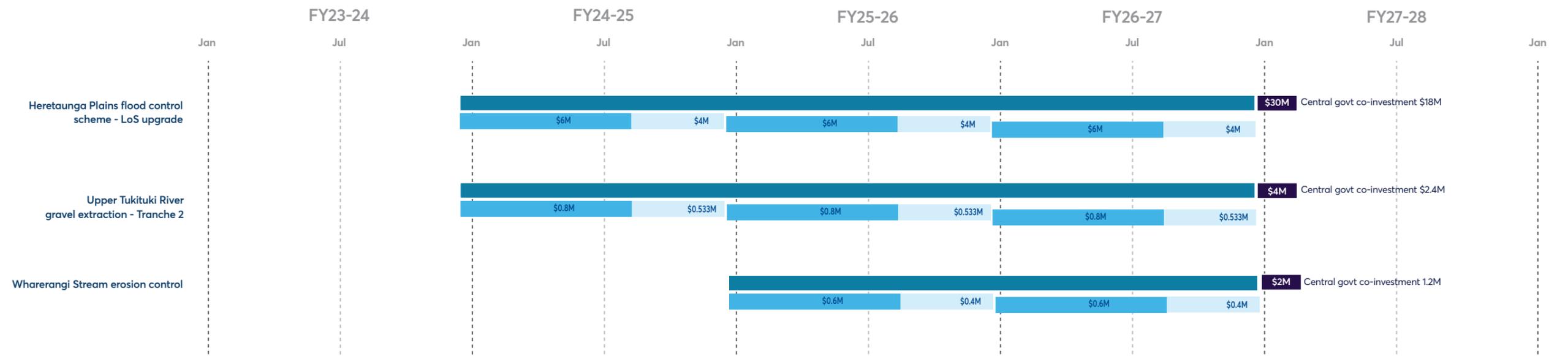


# Delivery timeline by council

## Horizons Regional Council project list

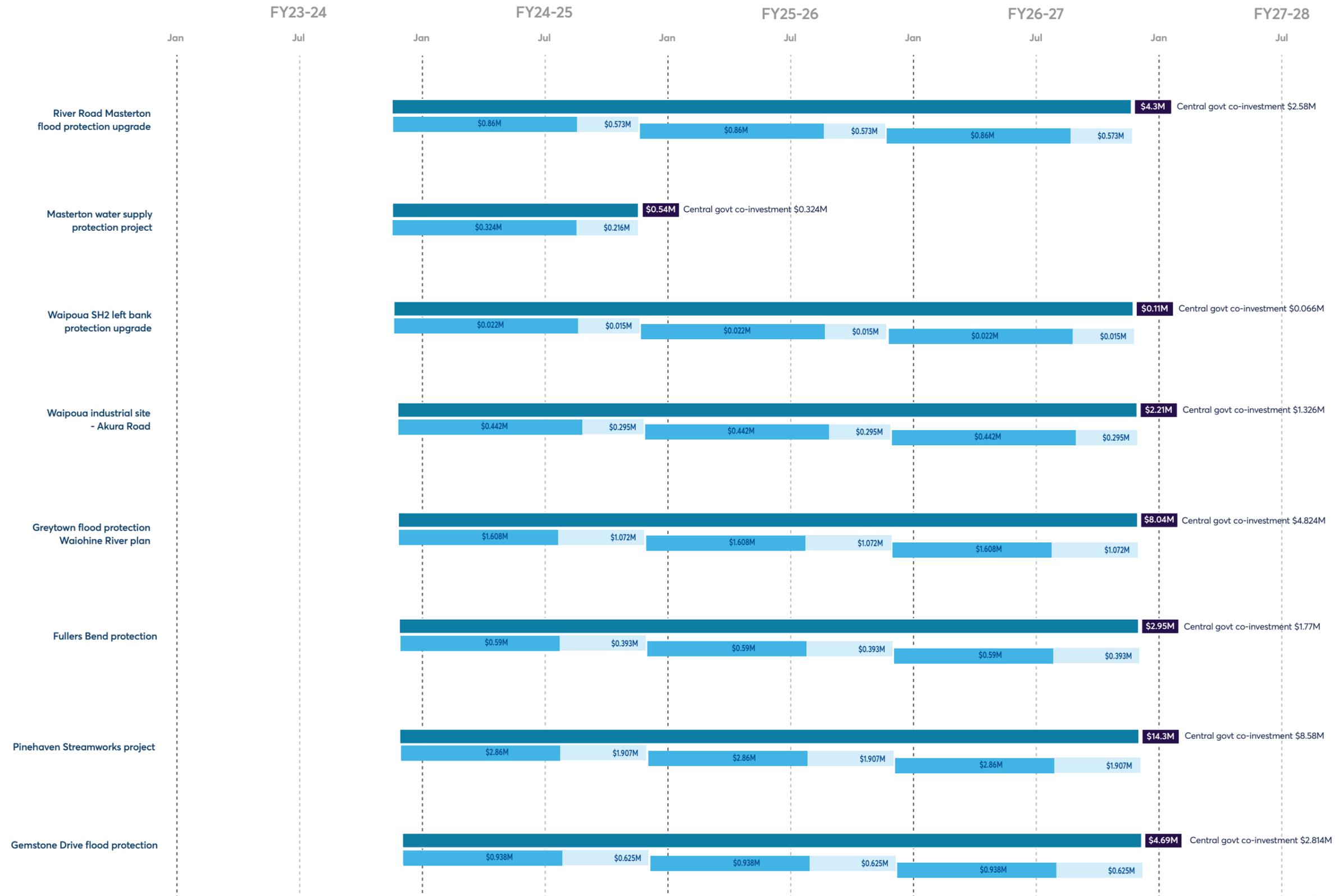


## Hawke's Bay Regional Council project list



# Delivery timeline by council

## Greater Wellington Regional Council project list (1 of 2)



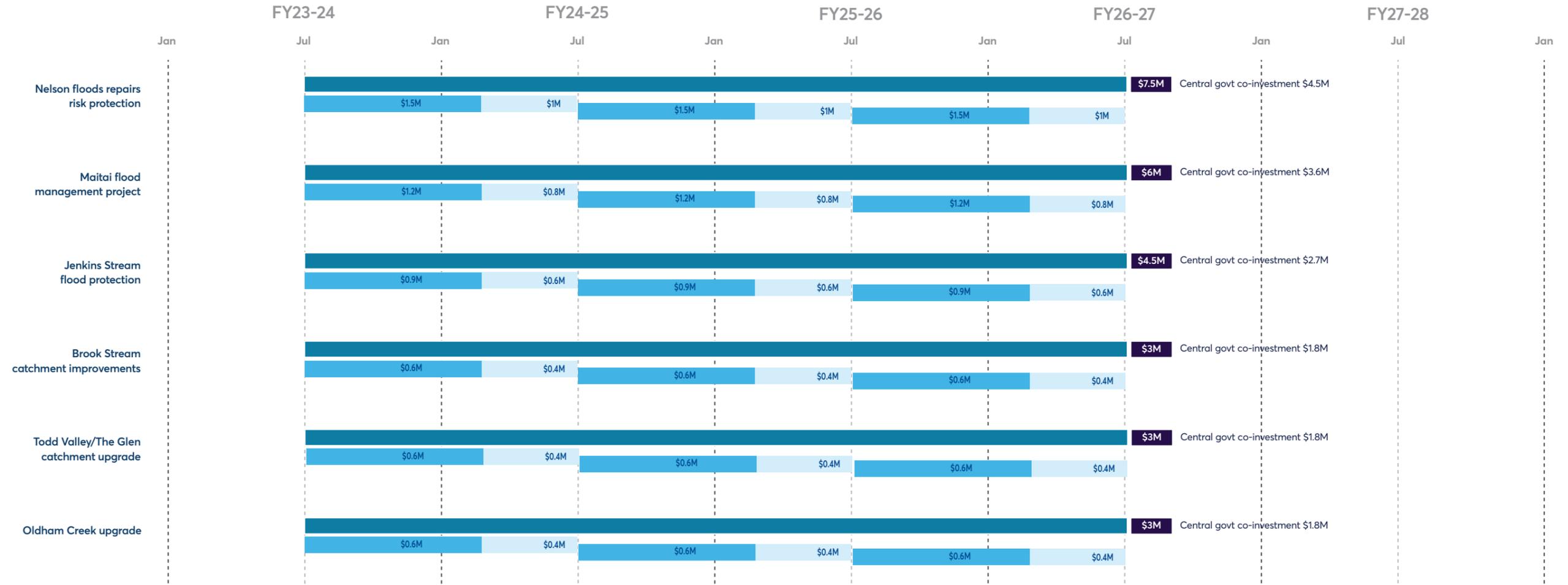
# Delivery timeline by council

## Greater Wellington Regional Council project list (2 of 2)

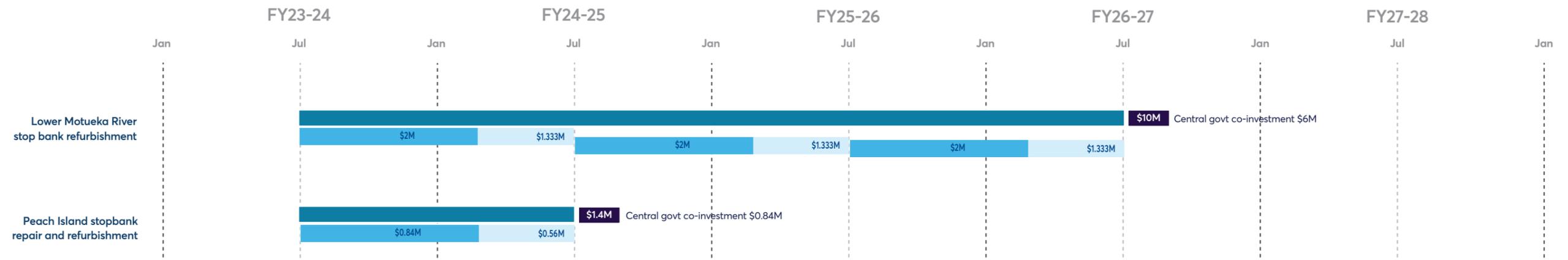


# Delivery timeline by council

## Nelson City Council project list

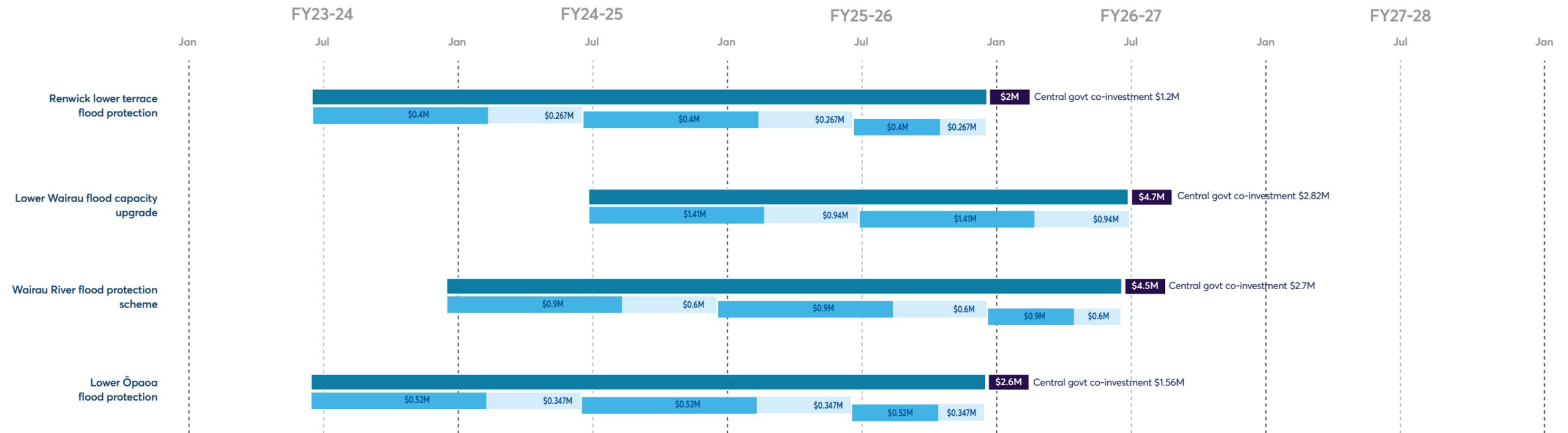


## Tasman District Council project list



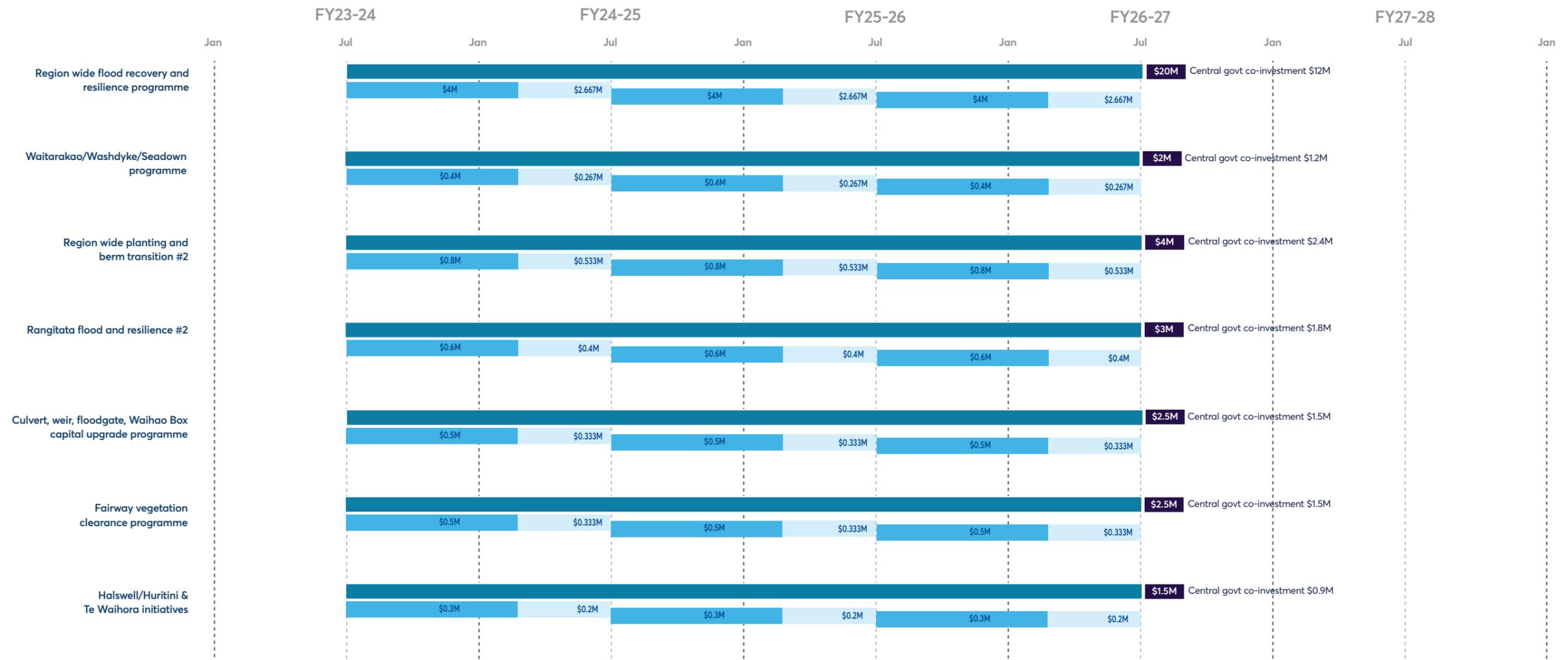
# Delivery timeline by council

Marlborough District Council project list



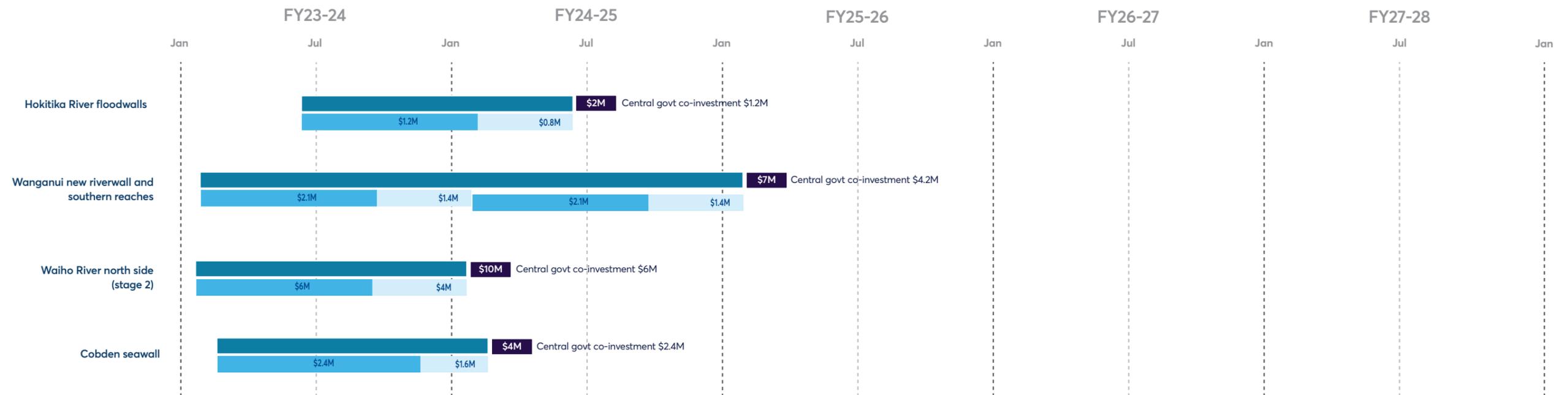
# Delivery timeline by council

Environment Canterbury project list



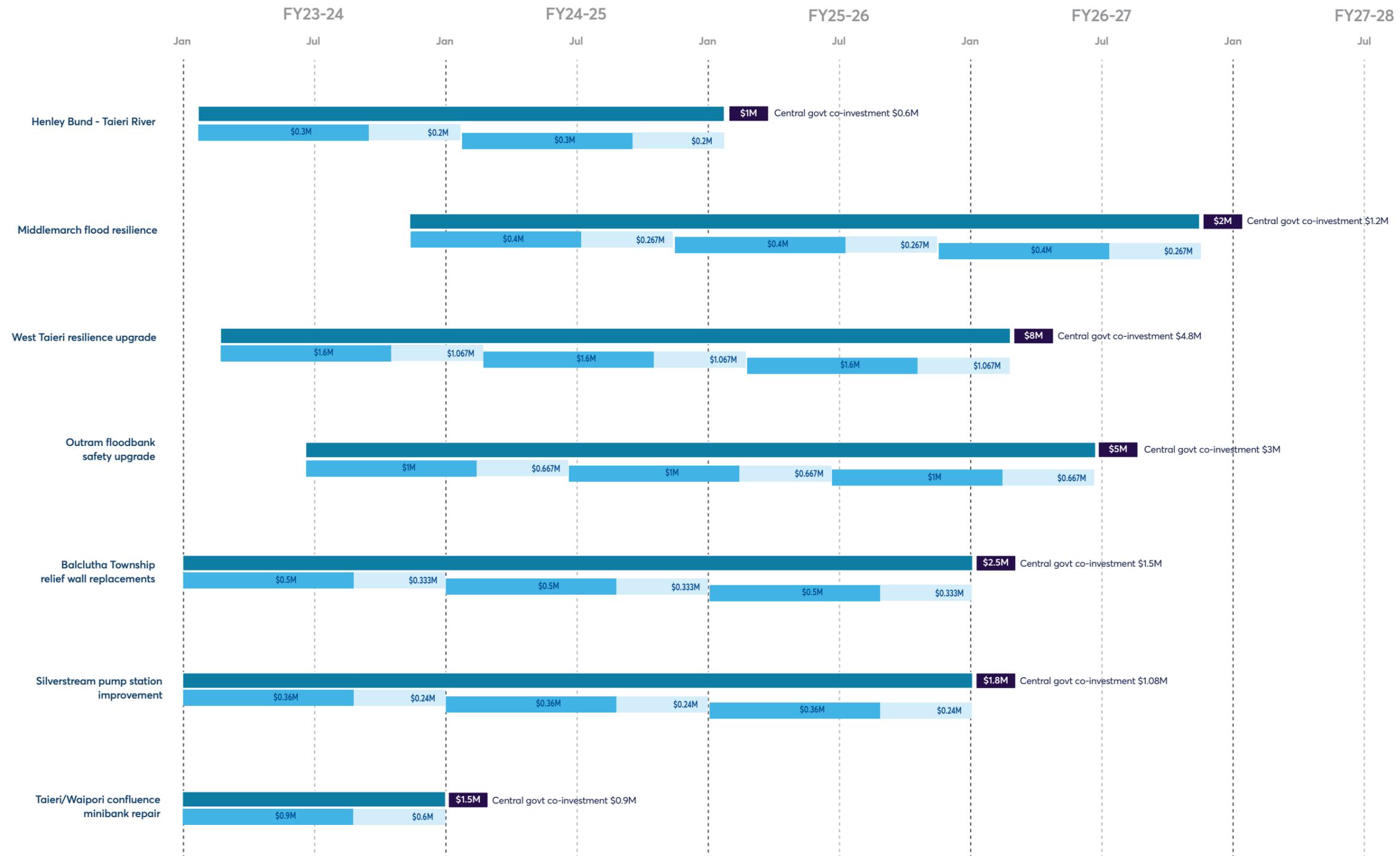
# Delivery timeline by council

West Coast Regional Council project list



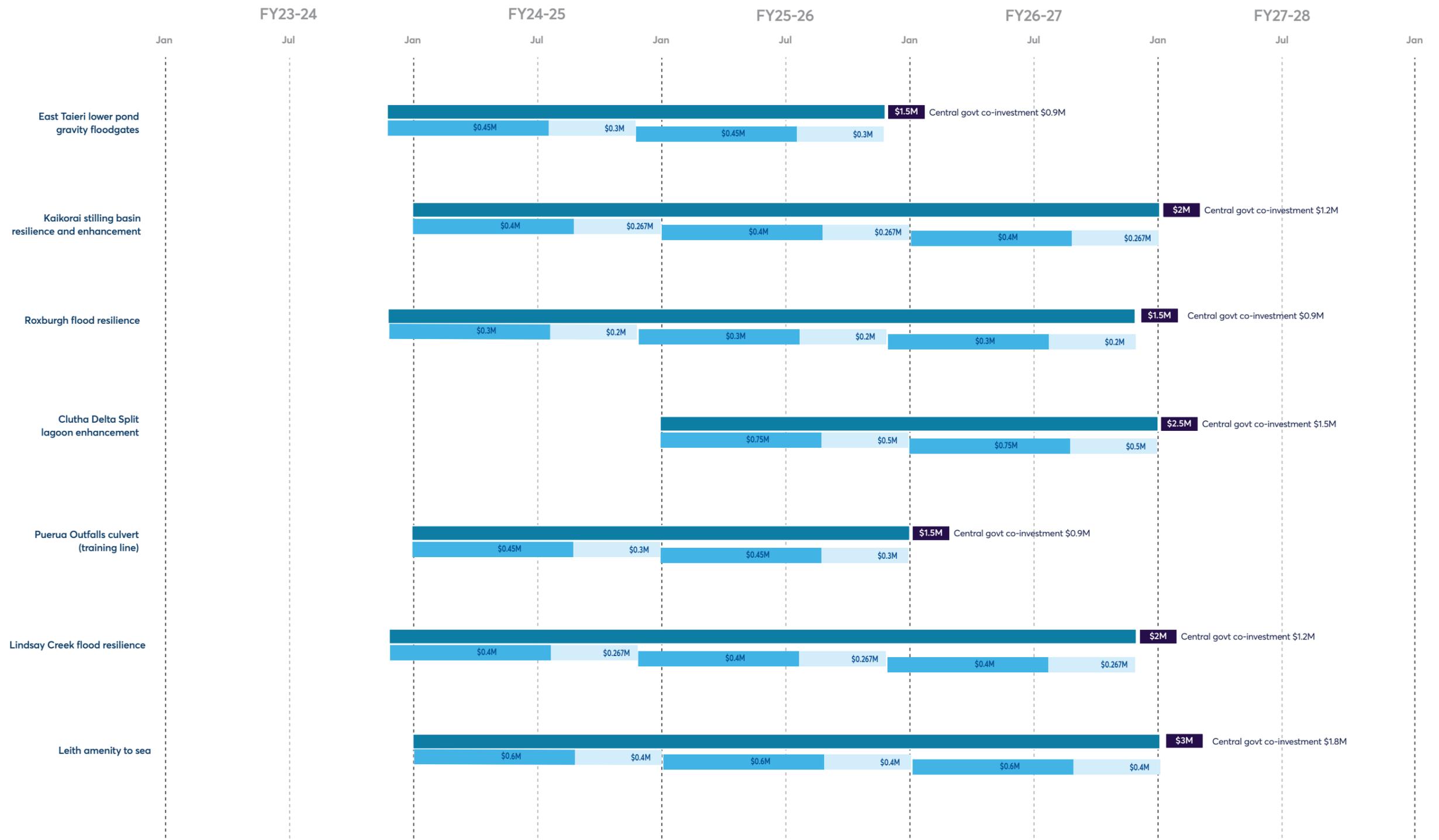
# Delivery timeline by council

Otago Regional Council project list (1 of 2)



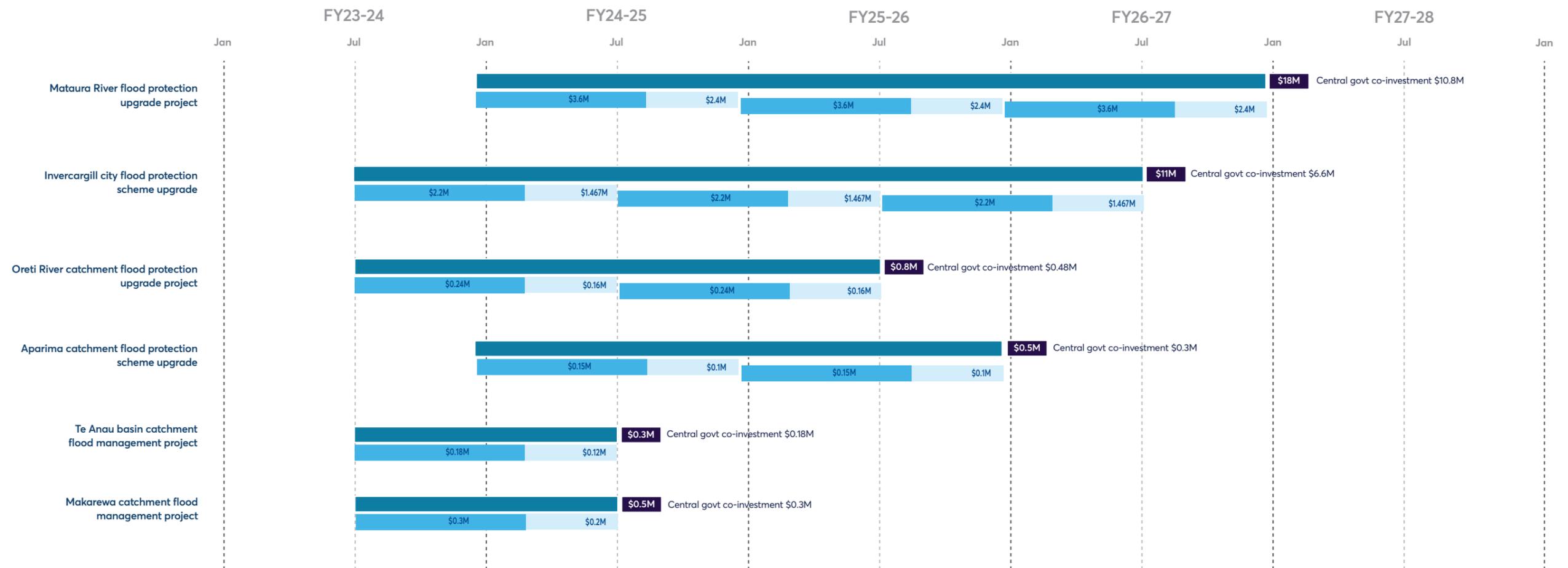
# Delivery timeline by council

Otago Regional Council project list (2 of 2)



# Delivery timeline by council

## Environment Southland project list





**Te Uru  
Kahika**

Regional and  
Unitary Councils  
Aotearoa