



Te mahere urutaunga ā-motu (tuhinga hukihuki)

Draft national adaptation plan



Ministry for the
Environment
Manatū Mō Te Tāiao



Te Kāwanatanga o Aotearoa
New Zealand Government

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Building a climate-resilient Aotearoa – together

As I write this, residents in Gisborne are being evacuated from their homes while rivers overflow after persistent heavy rain. Aotearoa New Zealand has always had dramatic weather. But floods such as those in Tairāwhiti, storms such as those experienced recently in Westport and droughts such as those experienced, well, just about everywhere are becoming both more severe and more frequent. More lives and livelihoods are on the line. The outlook is especially troubling, considering the potential for disproportionate effects on Māori, people with disabilities, low-income families and rural communities.

So as the image of tomorrow becomes clearer and more certain, a purely reactive approach to climate impacts becomes ever less credible. Instead, we need to plan and we need to prepare. For too long we have pushed climate adaptation to the back of the cupboard. Now is the time for a real step-change in our approach. Because the sooner we start, the more effective our efforts will be.

This document is the draft of New Zealand's first national adaptation plan. It brings together in one place the Government's current efforts to help to build our climate resilience. And it sets out a proposed future work programme, indicating our priorities for the next six years. The actions in this plan are intended to drive a significant, long-term shift in our policy and institutional frameworks. And they will result in better information about what our future climate will look like, enabling better decisions about our response.

Of course, we mustn't lose sight of the urgent need to lower our emissions. Because the severity with which we will experience climate change can be lessened if we do all we can to limit warming. With that in mind, we will also soon release New Zealand's first emissions reduction plan. But we know some climate impacts are locked in. And we know those impacts will be felt differently by different people and in different regions.

Central government will not bear every risk and cost of climate change, including climate change adaptation. Risk and cost will fall across different parts of society, including asset or property owners, their insurance companies, their banks, local government and central government. The Government has choices about the role it plays and how it influences the way these costs and risks fall. Care will need to be taken to manage any perverse or unintended outcomes such as moral hazard (that is, inappropriate incentives to continue developing in at-risk areas).

The Government needs your feedback on its plans. In particular, we want to hear about how climate change is already affecting you, the potential impacts you are concerned about, the actions you are already taking and what other actions are needed. Read the [Adapt and thrive: Building a climate-resilient New Zealand consultation document](#), which also sets out proposals for managed retreat and flood insurance.



Hon James Shaw
Minister of Climate Change

Aotearoa New Zealand's first national adaptation plan will enable New Zealanders to build resilience and adapt

This is New Zealand's first national adaptation plan. It's a very important milestone in the journey of every New Zealander to resilience and adaptation. It sits alongside the emissions reduction plan and together they lay out New Zealand's overall response to climate change so that we can transition to a low-emissions, climate-resilient future.

With this plan, for the first time as a nation we can see in one place what is being done already to adapt and proposals for what to do in the future. Actions within this plan will mean all levels of government, sectors and communities and all New Zealanders better understand the top-priority risks and act to address them.

We have a clear picture of the top-priority risks from the first National Climate Change Risk Assessment released in 2020. These include risks to coastal ecosystems, community wellbeing, potable water supplies, and buildings. This plan addresses those risks. We need systems, practices and tools that are set up to consider risk and uncertainty.

New Zealanders are already feeling the impacts of climate change. These impacts affect people and communities differently because they have varying degrees of exposure, or different capacity to prepare for and respond to climate impacts. We need to understand these different vulnerabilities to enable future actions to be targeted to support those most vulnerable to the impacts of climate change.

More change will come and impacts will increase, disrupting nature and society, affecting people's health and wellbeing and damaging livelihoods. We need to change how we do things so we can thrive in a climate that continues to change.

Past emissions have already changed our climate and will continue to do so in years to come. How much more change and how fast change will happen depend on every country's contribution to reduce global emissions.

We need to build on action that people are taking already. By preparing and working together, we can build a New Zealand that is resilient and ready to thrive in a changing climate.



Vicky Robertson
Chair, Climate Change Chief Executives' Board

Our climate reality: why we need to adapt to the impacts of climate change

In the past 100 years, our climate has warmed by 1.1 degrees Celsius. Aotearoa New Zealand is experiencing more hot days and fewer cold days; 2016 was the warmest year on record.

Sea-level rise is continuing at a rate of 2.4 millimetres each year. This poses a distinctive and severe adaptation challenge as we must deal with slow onset changes alongside increased frequency and magnitude of extreme sea-level events.

Coastal erosion and flooding can damage people's homes as well as roads and other infrastructure, affecting access to coastal areas. Rising sea levels also threaten coastal ecosystems and existing three waters infrastructure.

Extreme weather events, such as storms, heatwaves and heavy rainfall, are likely to be more frequent and intense. Extreme rainfall events are expected to occur more everywhere in the country, particularly in Northland due to a projected increase in the number of ex-tropical cyclones.

The number of **frost and snow** days are projected to decrease, while dry days increase for much of the North Island and for some parts of the South Island.

Changes in temperature and seasonality will have implications for agriculture and horticulture, and will affect where certain crops, such as kiwifruit, can be grown. Changes to the number of snow days will affect skiing and other snow activities, impacting the tourism industry.

Drought is projected to increase in frequency and severity, particularly along the eastern side of the Southern Alps. Increased drought puts pressure on our multiple uses of freshwater – for reliably accessible drinking water, electricity generation and many forms of recreation from swimming to fishing. It also makes New Zealand's agriculture sector particularly vulnerable to declining crop yields and pasture growth.

Projections indicate we will have stronger **north-easterly airflows** in summer and, particularly in the south of the South Island, stronger westerlies in winter. This has implications for rainfall patterns, with increased summer rainfall projected for the north-east of the North Island and increased winter rainfall for the West Coast of the South Island.

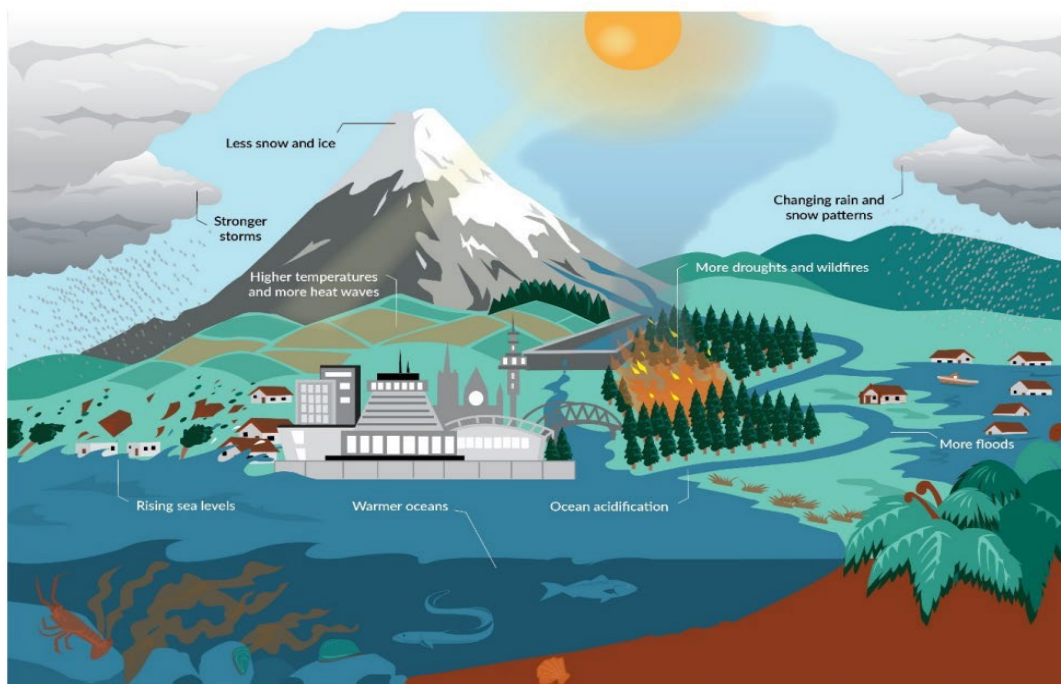
Wildfire risk is projected to increase in many areas towards the end of the century, due to higher temperatures and wind speeds, and lower rainfall and relative humidity.

Although no one yet knows how precise these projections are, particularly about conditions towards the end of the century, they present plausible futures resulting from climate change under a range of scenarios¹ for global emission reductions. How much change will happen and how fast will vary.

¹ The Representative Concentration Pathways (RCPs) are greenhouse gas concentration scenarios the International Panel for Climate Change adopted for its Fifth Assessment Report. They describe four alternative futures, in which possible scenarios of human activities result in different concentrations of greenhouse gases in the atmosphere.

Figure 1 illustrates the range of changes that projections indicate we will face as a result of climate change.

Figure 1: Projected impact of climate change on New Zealand



Adaptation

In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2018).

We have a clear picture of the priority risks New Zealand faces from climate change to 2026

The actions in this plan are focused on addressing the 43 priority risks New Zealand faces from the impact of climate change from 2020–26. These priority risks were set out in the National Climate Change Risk Assessment (NCCRA) published in 2020 (Ministry for the Environment, 2020) Table 1 highlights the 10 most significant risks.

This national adaptation plan sets out how New Zealand will address those risks. Actions in this plan will help to address all 43 risks and the risk to the telecommunications network.

How our current risk management system works

New Zealand faces some of the greatest natural hazard risks of any country in the world. Climate change will increase the severity and frequency of some natural hazards, and present new risks associated with slow-onset, gradual changes.

The current approach to risk management in New Zealand is about identifying and monitoring risks to our wellbeing, taking action to reduce our existing levels of risk, minimising the amount of new risk we create, and ensuring everyone has the information and tools they need to make informed decisions.

New Zealanders face a considerable amount of risk in our society due to the hazards we are exposed to, and the vulnerability of people, assets, and services to impacts. It is important for us to try to reduce existing risk so the chances of disaster are reduced, and/or the impacts are reduced when events occur. We also need to recognise how we can inadvertently add to risk through poor development choices, including land-use and building choices. Planning for resilience at the outset of new projects is by far the cheapest and easiest time to minimise risk and has the potential to significantly reduce disaster costs in the future.

A key feature of our risk management system is that everyone has responsibilities to manage their own risks, as far as possible. Central government does not bear all the risks and costs. Risk and costs are shared between asset or property owners, their insurance companies, their banks, local government and central government. This will continue to be important as New Zealand takes action to become more resilient.

Table 1: The 10 most significant risks New Zealand will face from climate change 2020–26

Natural	Human	Economy	Built	Governance
Risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea-level rise and extreme weather events.	Risks to social cohesion and community wellbeing from displacement of individuals, families and communities due to climate change impacts. *	Risks to governments from economic costs associated with lost productivity, disaster relief expenditure and unfunded contingent liabilities due to extreme events and ongoing, gradual changes.	Risks to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise. *	Risks of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.
Risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.	Risks of exacerbating existing inequities and creating new and additional inequities due to differential distribution of climate change impacts. *	Risks to the financial system from instability due to extreme weather events and ongoing, gradual changes.	Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise. *	Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation.

* The risk has disproportionate impacts on Māori.

Source: National Climate Change Risk Assessment for Aotearoa New Zealand

These impacts affect all New Zealanders – but some New Zealanders may be more affected and less able to respond

Māori as tangata whenua are particularly sensitive to climate impacts on the natural environment for social, economic, cultural and spiritual reasons. Many Māori depend on primary industries for their livelihoods. In some places, climate change may alter patterns of use of mahinga kai (food-gathering sites) or rongoā crops (medicinal plants), and coastal impacts could disrupt access to marae or wāhi tapu (sacred sites).

Different groups experience extreme events and disaster responses differently. Older people may be more reluctant to evacuate their homes after weather events and suffer from the loss of cultural and social networks. Ethnic minorities are more vulnerable in disaster responses due to language and integration barriers.

If communities need to shift, low-income groups have less choice on where to relocate and are less able to move elsewhere. Mobility-compromised and disabled people have specific needs that can be overlooked when decisions are made around new community locations and accessible housing.

Some groups feel the psychological and physical impacts of climate change disproportionately more than others. Young people and children are more prone to psychological impacts from extreme events, while women are more vulnerable to incidents of domestic violence, which can increase in times of disaster. Farming and rural communities are vulnerable to mental health problems that could arise due to the effect of climate change on livelihoods.

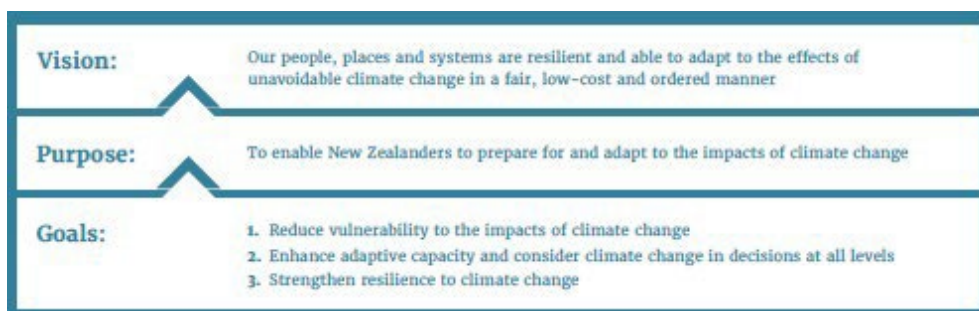
Those with poorer health outcomes than the general population, such as Māori and Pacific people, children and older people, may also physically suffer more from increased heat and disease. New Zealanders are already experiencing the impacts of climate change. As the impacts increase, there is a risk that existing vulnerabilities will deepen.

This plan is the first step in a long-term adaptation strategy and process

Our long-term adaptation strategy is focused on managing the uncertainty that comes with climate change

As our climate continues to change, the impacts and risks we face will also evolve. To manage the uncertainty about the extent of change, this first national adaptation plan sets a long-term vision and high-level goals for adaptation action. This plan is the first step on the pathway towards meeting the following vision and goals for a climate-resilient New Zealand.

A common vision, purpose and goals



These climate adaptation goals are long term, extending beyond the life of this first plan. The intention is to keep the broad focus of each goal consistent in future national adaptation plans, although the specific areas for action within each future plan are likely to change.

Reducing vulnerability to the impacts of climate change means the focus is on the most immediate climate risks and impacts and on strengthening the emergency management system.

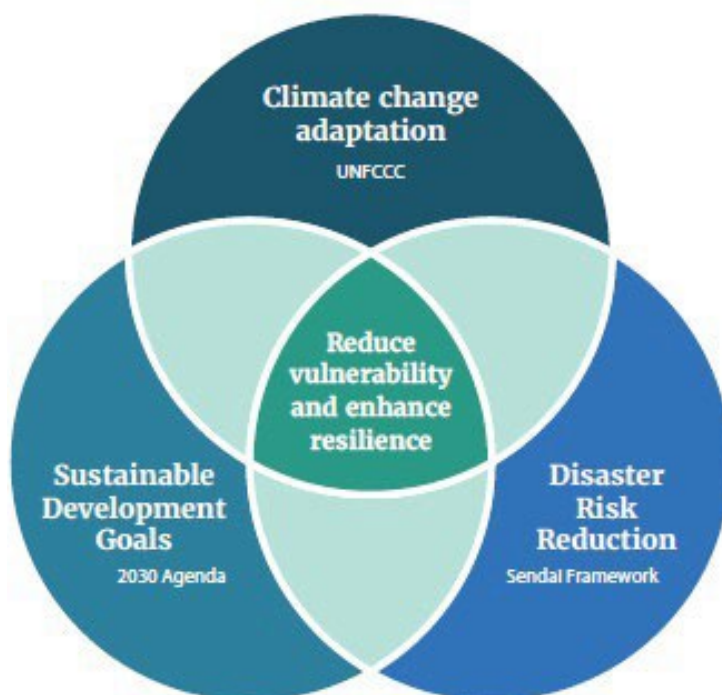
Enhancing adaptive capacity and considering climate change in decisions at all levels means the focus is on people and enabling action across all sectors and communities.

Strengthening resilience also means thinking long term about the system-wide changes that are needed and what we need to do to lay the groundwork now for further action in the future.

The goals are consistent with the Global Goal on Adaptation that was established under the Paris Agreement.

New Zealand is also signatory to several international agreements that support action to reduce vulnerability and enhance resilience. These include the Sendai Framework for Disaster Risk Reduction and the 2030 Agenda for Sustainable Development, as well as agreements under the United Nations Framework Convention on Climate Change (UNFCCC) process, including the Paris Agreement (figure 2).

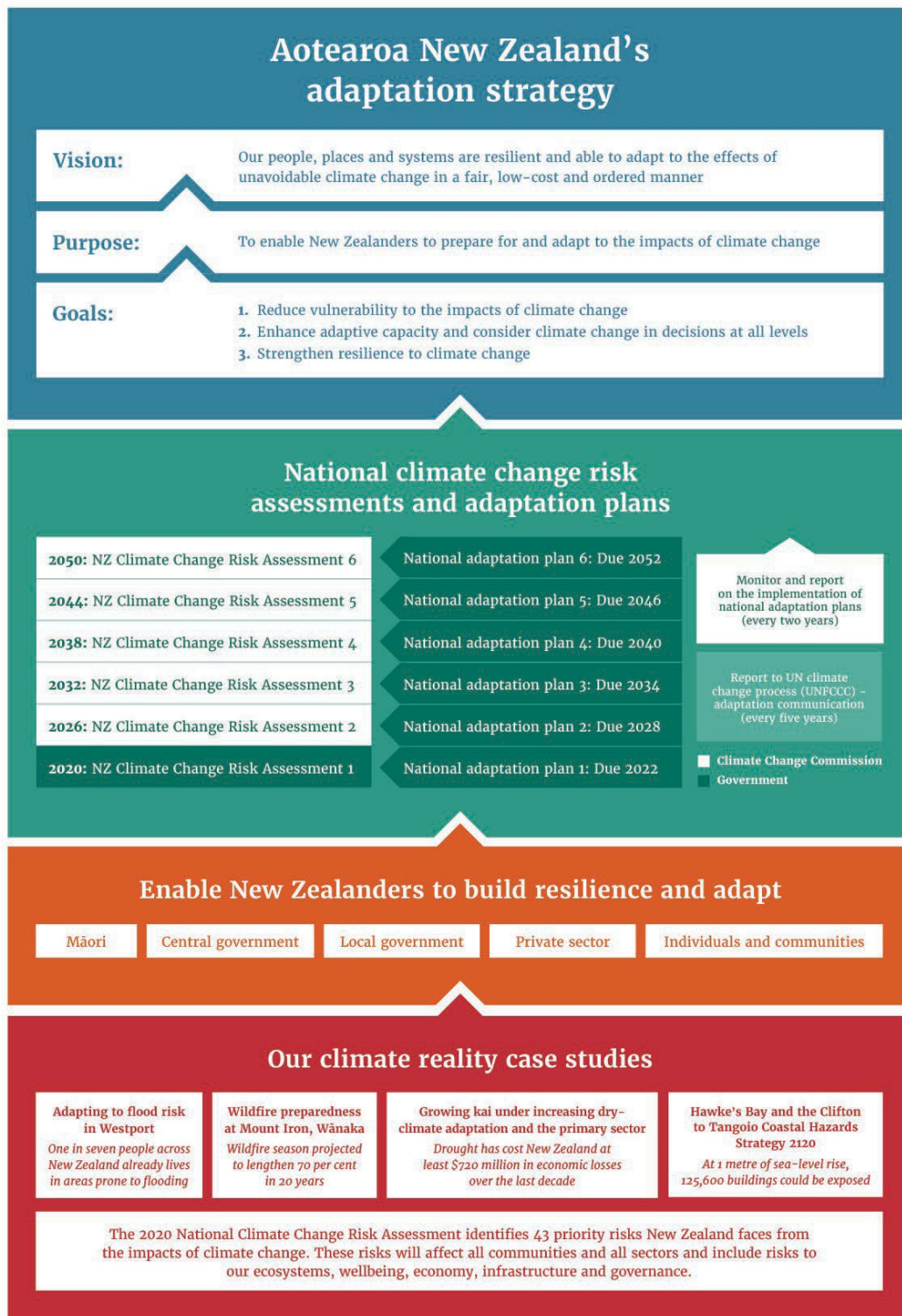
Figure 2: How adaptation action is integrated across the Paris Agreement, the 2030 Agenda and the Sendai Framework



Our first national adaptation plan will enable New Zealanders to build resilience and adapt

This is a Government-led plan for all New Zealanders. All New Zealanders have a role to play in understanding climate risks and building resilience to the effects of climate change. The strategy map below contains both the Government’s long-term direction for adaptation action and the objectives for the first national adaptation plan.

Figure 3: New Zealand’s adaptation strategy



2022 National adaptation plan 1

This national adaptation plan will:

1. Reform institutions to be fit for a changing climate
2. Provide data, information and guidance to enable everyone to assess and reduce their own climate risks
3. Embed climate resilience across government strategies and policies

Outcome areas and objectives

Natural environment	Homes, buildings and places	Infrastructure	Communities	Economy and financial system
Ecosystems which are healthy and connected, and where biodiversity is thriving	Homes and buildings are climate resilient and meet social and cultural needs	Reduce the vulnerability of assets exposed to climate change	Enable communities to adapt	Sectors, businesses and regional economies can adapt; participants can identify risks and take action
Robust biosecurity reduces the risk of new pests and diseases spreading	New and existing places are planned and managed to minimise risks to communities from climate change	Ensure all new infrastructure is fit for a changing climate	Support vulnerable people and communities	A resilient financial system underpins economic stability and growth; participants can identify, disclose and manage climate risks
Support working with nature to build resilience	Māori connections to whenua and places of cultural value are strengthened through partnerships	Use renewal programmes to improve adaptive capacity	Support communities when they are disrupted or displaced	
	Threats to cultural heritage arising from climate change are understood and impacts minimised		The health sector is prepared and can support vulnerable communities affected by climate change	

System-wide outcome areas and objectives

Legislation and institutional arrangements are fit for purpose and provide clear roles and responsibilities	Robust information about climate risks and adaptation solutions is accessible to all	Tools, guidance and methodologies enhance our ability to adapt	Unlocking investment in climate resilience
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Action plans: prioritising and focusing action to address risks

This first national adaptation plan brings together existing actions and proposed future work into a multi-year work programme. The actions within this plan are what central government will do to enable all levels of government, sectors and communities and all New Zealanders to better understand the risks of climate change and take action to address them.

Adaptation planning requires a flexible approach that can accommodate change but keep us moving in the right direction. Inevitably, actions in the later years of this plan are less clearly defined. Over time, decisions will be made on which proposals to progress and when, or if something else is needed, and will need to be firmed up as the results of earlier actions become clear.

New Zealand's first national adaptation plan has three focus areas

Focus area one: Reform institutions to be fit for a changing climate

New Zealand already has systems and institutions in place to plan for and respond to natural hazard risks or manage natural resources and infrastructure. Yet these were designed for a climate of the past. They need to better reflect the greater and changing climate impacts we face.

Actions in this plan will reset New Zealand's most critical planning and response systems to deliver climate resilience. These changes will be designed so that today's decisions about how we manage our resources consider the future climate. By doing this now, New Zealand will have the right foundation in place to address climate risks. For actions relating to this focus area, see [Reform institutions to be fit for a changing climate](#) in the section about systems-wide actions.

Focus area two: Provide data, information, tools and guidance to allow everyone to assess and reduce their own climate risks

All New Zealanders will need to adapt to the impacts of climate change. The first step is for you to understand and assess the risks you face.

Actions in this plan will make it easier to access up-to-date information and guidance on climate risk that you can use to assess what future climate changes are most important for where you are and how you live. For actions relating to this focus area, see [Provide data, information, tools and guidance to allow everyone to assess and reduce their own climate risks](#) in the section about systems-wide actions.

Focus area three: Embed climate resilience across government strategies and policies

Adapting to climate impacts requires widespread change.

Actions in this plan will embed the consideration of existing and future climate risk in all government strategies and proposals, so that adaptation becomes a mainstream part of government policy. The sections about each outcome area give details of actions relating to this focus area.

Working together for a climate-resilient New Zealand

Collaboration is vital for effective adaptation as climate change affects us all. We all have a role to play in building a more climate-resilient New Zealand.

As a nation, we all know about the risks from earthquakes and play our part in preparing for them.

As an economy based heavily on the natural environment, we also have well-established ways of preparing for severe weather events. Most hazard events occur at the local or regional scale. That is why New Zealand’s hazard risk management and emergency planning frameworks place a strong emphasis on local initiatives for risk reduction. We are a resilient and innovative country. To be resilient in our response to a changing climate, we need to work together to understand and prepare for the changes that can affect us.

Table 2 lists the principles that the Government has set for the first national adaptation plan. These outline the kind of changes we need to make to the way we manage risk.

Table 2: Principles of the national adaptation plan

Principles for adaptation action	
Principles for including actions in the plan	1. Be proactive: Anticipate change and take practical steps to adapt.
	2. Think long term: Take an intergenerational perspective that spans political, planning and financial cycles, to plan for a changing climate.
	3. Maximise co-benefits: Use adaptations that achieve complementary goals while avoiding maladaptation.
	4. Promote equity: Prioritise helping the people, places and infrastructure that are most vulnerable to climate impacts, while building adaptive capacity for all.
Principles for implementing actions	1. Collaborate: Adapt in partnership with iwi, hapū, Māori and all New Zealanders – ara whakamua.
	2. Adjust as we go: Design actions and decisions to be revisited and adjusted as circumstances change.
	3. Mainstream adaptation: Embed climate resilience as a core consideration in all decision making.
	4. Make well-informed decisions: Use the best available evidence, including science, data, local knowledge and mātauranga Māori.
	5. Work with nature: policies, planning and regulation should protect enhance and restore nature and that any impacts on nature should be mitigated as much as possible.
	6. Adapt locally: Enable communities to prepare for the unique risks and opportunities they face, and tailor intervention to the local situation.

Enabling adaptation – leading roles

Climate change will affect all New Zealanders. Everyone needs to assess and manage their risk, and consider what climate change might mean for them.

The government cannot bear all of the risks and costs. We will have to work out how these can be shared across a range of different groups.

New Zealand has a well-established system of natural hazard risk management and reduction. Climate change increases the risks we face from many natural hazards. There are existing roles and responsibilities to prepare for and manage these risks remain.

Local government (city, regional, district and unitary councils) is on the front line in preparing for and dealing with climate impacts and risks. Local authorities have statutory responsibilities to make key decisions on how to use and manage land and other natural resources to avoid or mitigate impacts of natural hazards. This includes responsibilities to plan for and invest in improving community resilience. They also own a significant amount of assets, including infrastructure and forests, that are at risk from the impacts of climate change.

For most people, local authorities are the government bodies that are closest to their communities and represent local views. Examples of this connection include the role of local authorities in land-use planning, water resources, three waters services, flood risk management, biodiversity and biosecurity, roading and emergency management. Local government enhances community resilience through public education and local planning processes. Many councils are already addressing the impacts of climate change and proactively integrating climate risk into current and future planning.

Iwi/Māori All the NCCRA risks are relevant to Māori as tāngata whenua (people of the land) and kaitiaki (guardians) of their ancestral and cultural landscape. Some risks may disproportionately affect certain whānau, hapū and iwi, as well as Māori interests, values, practices and wellbeing.

Te Tiriti o Waitangi obliges the Government and Māori to make decisions together in a way that balances kāwanatanga (the Government's right to govern) with rangatiratanga (the Māori right to make decisions for Māori). The NCCRA recognises the Government's responsibility to give effect to Te Tiriti principles.

The private sector has a significant role in:

- strengthening its resilience to future risks
- directing investment in adaptation, which can strengthen the resilience of infrastructure, production systems and supply chains. Good risk management practice includes understanding and developing strategies to manage these risks. Businesses may also identify economic opportunities from better managing their climate risks, such as benefitting from new technologies and markets.

Banks and insurers in particular may be exposed to climate risk through their mortgage portfolios and liabilities. By investing in resilience measures or supporting customers to do the same, banks and insurers can reduce their exposure. They also have the potential to support others to fund adaptation actions, through loans or 'build back better' post-event payments.

Individuals and communities have a role because climate change is increasingly affecting daily life. Impacts include rising costs due to disruptions in supply chains as a result of climate impacts, power cuts due to extreme weather events, or the need to evacuate homes due to flooding or fires.

Communities and individuals need to be involved in decisions on adaptation where they will directly feel the effects. Knowledge and data on climate impacts and risk will help them to make informed choices about responding to climate change, so they can prepare for the impacts and manage risks.

The research and scientific community needs to contribute because adaptation decisions at all levels should be based on the best available science. Producing that science and making it accessible to address climate risk – by reducing vulnerability, building adaptive capacity and increasing long-term resilience – is a cornerstone of advancing New Zealand’s adaptation action.

Central government has a key role in enabling climate-change adaptation across all communities, sectors and regions of New Zealand.

The Government provides leadership and direction on adaptation through coherent governance and institutional arrangements, and by administering and informing climate policy. It uses legislation, funding and regulation to do this.

The policies that Central government set influences the choices of others. This can involve providing information and data not otherwise available or setting regulations for land use, building standards and insurance. Climate policy is a whole-of-government approach, in which each department or agency has a part to play.

Central government also manages the risks to its own assets and infrastructure. This includes schools, hospitals, police stations, and prisons as well as services, for example conservation and biosecurity.

For a more detailed explanation of these roles and responsibilities, see appendix 4.

Case study: Climate Leaders Coalition

In many areas, the New Zealand private sector is already taking action to manage risks from climate change. One example is the Climate Leaders Coalition (the Coalition).

The Coalition brings together more than 100 chief executives from various industries who have committed their organisations to taking voluntary action on climate change. The Coalition’s mission is to respond to climate change through collective, transparent and meaningful climate action. For 2022, one of the Coalition’s focus areas is climate-change adaptation. This means understanding the climate risks businesses will face and planning for these to help build resilience in these organisations.

In 2021, close to a third of the Coalition’s signatories assessed and disclosed their climate risks, and more than half are working to disclose soon. Among the signatories, 80 per cent are already considering climate risks in their investments and planning. The Task Force on Climate-related Financial Disclosures framework is signatories’ preferred approach to assessing climate change risks, and more than a third are either fully or partially compliant with it (as at April 2021).

By making the consideration and management of climate risk part of their operations, as well as reducing emissions, businesses are planning now for the future.

Working in partnership and recognising the indigenous worldview

In developing this plan, the Government acknowledges an indigenous worldview of climate change.

The Rauora framework, published separately from this national adaptation plan, brings together Māori values and principles into an indigenous worldview of climate change. The framework is a foundation from which iwi, hapū and whānau can apply their own mātauranga-a-iwi (knowledge with an iwi-specific base).

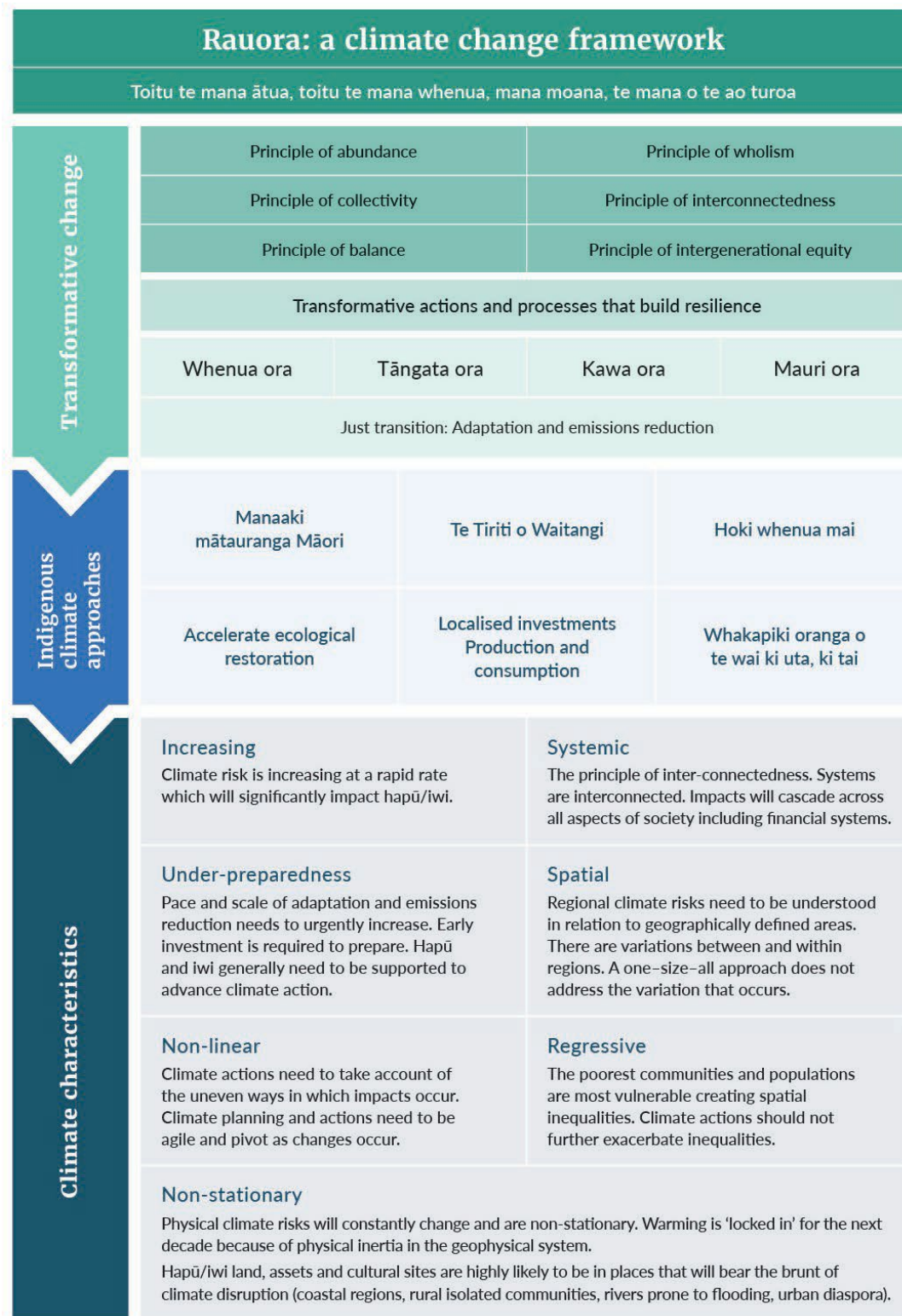
For the Crown, the framework acknowledges that its Tiriti partners have a worldview that sits outside Western interpretations, and that the Government has commitments to uphold.

The Rauora framework (figure 4) is a holistic approach to climate change, where enduring and unbroken relations between Papatūānuku (earth mother) and Ranginui (sky father) and beyond inform the relationships among us, with others and with the environment. The enactment of these relationships (whakapapa) through tiers and intersections are associated with mana, tapu and noa.

As a government plan, the national adaptation plan draws on key concepts of the Rauora framework. Notably, the framework supports and promotes transformative approaches, resilience building and the development of supporting measures.

The notion of whenua ora, tāngata ora, mauri ora recognises that the land, people and associated life forces are interconnected. In this way, a well land is a well people and so too are the life forces of these components of the world. The notion of kaitiakitanga is implicit within this approach, where Māori continue to strengthen their stewardship role within the environmental space.

Figure 4: Rauora: a climate change framework



Case study: Ngaa Rauru Kiitahi Climate Change Strategy

Climate action for Ngaa Rauru Kiitahi, a small iwi in south Taranaki, is encapsulated in their recent climate change strategy. The iwi and the Ministry for the Environment co-developed this strategy as a case study in understanding the complexities of climate change for small post settlement governance entities.

The strategy is entitled *Ka mate kaainga tahi, ka ora kaainga rua: When a place of abode retires, another as prepared emerges*. This whakatauaakii (proverb) refers to values from the iwi's own ancestral pathways – preparedness, agility, resilience and future thinking – that ensure safety and survival.

Preparing a second place of abode sits within a broader context – that extreme weather conditions and projected flooding patterns will affect marae, communities, hapuu, culturally significant assets and businesses. Climate change is viewed as a phenomenon that will impact every facet of their lives. The strategy, then, is more than an environmental plan; it extends to include social, economic, ecological and cultural implications.

“We have a responsibility, whaanau, hapuu, marae and the iwi, to ensure that we are still here in 1,000 years’ time.” (Mike Noho, Tumu Whakarae, iwi chair, Ngaa Rauru Kiitahi)

The strategy is informed by a Ngaa Rauru Kiitahi conceptual framework known as Te Kawa Ora, which promotes a balance between all things. The environment is viewed as an extension of iwi through whakapapa (genealogy). To this end, relationships within the iwi and externally with others, including the environment, are viewed as fundamental to the approach. Importantly, the strategy challenges the iwi to (re)harness their own tikanga, kawa and maatauranga-a-iwi to advance climate action. Developments include their papakaainga, partnerships within the energy sector, land purchases for new businesses, expansion of alternative food sources and the regeneration of local flora and fauna.

Partnerships and alliances, capability and capacity building, and planning, implementation, research and evaluation are the key cornerstones to this strategy. All are built on a foundation of Ngaa Raurutanga.

Adapting to climate change is a process

As our climate is changing, we need to assess climate risks using long timeframes and plan accordingly. Then we must repeat this cycle, regularly. New Zealand's climate-change adaptation process is based on four components. Figure 5 illustrates what this process looks like over time.

Figure 5: New Zealand's adaptation process over time



How to use this document

Actions within this plan focus on six **outcome areas**:

- system-wide actions
- natural environment
- homes, buildings and places
- infrastructure
- communities
- economy and financial system.

Objectives: Each outcome area has a set of objectives to address the risks for that area.

Actions: Each objective has one or more actions to achieve that objective. Some actions are system-wide, because climate risks are interconnected and affect the broader systems of our society. The critical and supporting actions are committed. Other actions are proposals for a future work programme. These reflect current thinking about what will be needed in future, but what they look like or whether they need to go ahead will depend on future funding and/or policy decisions, including decisions to be made in future Budgets.

General questions

1. Climate change is already impacting New Zealanders. Some examples include extreme weather events such as storms, heatwaves and heavy rainfall which affects lives, livelihoods, health and wellbeing, ecosystems and species, economic, social and cultural assets, services (including ecosystem services) and infrastructure. How is climate change impacting you? This could be within your community and/or hapū and iwi, and/or your business/organisation, and/or your region.

Resilience planning has highlighted a number of effects that will impact the Ruapehu District. Increased frequency of storm events, flooding, subsidence and/or erosion of roads and tourism impacts due to lower levels of snow will significantly affect our ratepayers, our productivity, and our resilience to crisis events.

We are reliant on open-source water for our water supply, so we are heavily impacted by the takes from the electricity sector – meaning that both flooding and drought exacerbates our ability to ensure fresh water supplies for our ratepayers, particularly our farmers.

Our key tourism destination is the Tongariro National Park, which provides snow sports, hiking, mountain biking, fishing, and other recreational pursuits. With increasing temperatures, our snow tourism will cease to exist, and livelihoods will be impacted if we are too slow to adapt to the changes happening already. Our biodiversity is threatened, with weed species invading and thriving in the alpine areas due to the change in temperature and humidity.

The incentivisation of pine to mitigate climate change has seen our valleys filled, small communities disappearing, and ‘plant and leave’ set ups taking place. Pinus radiata planted in the wrong place due to these incentives has contributed further to erosion and sediment being washed downstream.

Ruapehu District is also isolated geographically, and heavily reliant on the state highways and access to supply chains. If these are disrupted by climate events, it poses a disproportionate effect on our agriculture and livelihoods. For example, in June 2015 the lower North Island experienced a significant flooding event that forced many people out of their homes in Whanganui and closed several State Highways around the lower North Island, including: SH4 from Raetihi to Whanganui, SH4 from Vinegar Hill to Cheltenham, SH43 from Stratford to Taumarunui, and SH3 through the Manawatu Gorge. The calculated loss in GDP for the Manawatu-Whanganui region over 6 months from the time SH4 was closed was \$3.5 million (Market Economics Limited, 2016).

In relation to this, healthcare and access to services is particularly challenging for our ratepayers, with our communities reliant on private vehicles. There are no alternatives at this stage to road, as rail has not yet become the public transport solution that we hoped it would. Our towns are built along the railway, which whilst it is an opportunity, means that all towns are on the flattest areas, and are therefore more prone to flooding.

We have a disproportionately high percentage of low-income ratepayers who will struggle to adapt to climate change impacts, both physically and financially. As the costs of living, heating, and cooling increase due to extreme weather, our low-decile population will be hit hardest. As we are a landlocked district, the Ruapehu District may benefit from people moving to the district, looking to move away from coastal impacts. However, this potential population influx needs to be managed carefully to ensure that our residents who already live here are not negatively impacted by rising property values and supply shortages.

We will likely be no more affected than any other District, as we are all vulnerable to the changes that are coming. However, the Ruapehu District Council thanks the Ministry for the Environment for the opportunity to submit on this draft Plan to ensure that the proposed actions and policy instruments are fit for purpose for our ratepayers. We support the change in thinking that has finally brought climate change to the forefront of issues facing New Zealand and has allowed for this document to be created.

(Reference: Market Economics Limited. (2016). *Economic Impacts of the State Highway 4 Outage – June 2015*. Auckland, New Zealand)

2. The national adaptation plan focuses on three key areas. Which area is most important for you?

Focus area one: reform institutions to be fit for a changing climate. This means updating the legislative settings so that those who are responsible for preparing for and reducing exposure to changing climate risk will be better equipped.

Focus area two: provide data, information and guidance to enable everyone to assess and reduce their own climate risks. This means that all New Zealanders will have access to information about the climate risks that are relevant to them

Focus area three: embed climate resilience across government strategies and policies. This means that Government agencies will be considering climate risks in their strategies and proposals.

Other? Please explain.

Option 3 – Climate risks need to be identified in every decision going forward on all levels.

3. We all have a role to play in building resilience to climate change, but some New Zealanders may be more affected and less able to respond. There is a risk that climate change could exacerbate existing inequities for different groups in society. [Appendix 3](#) sets out the full list of actions in this national adaptation plan.

- a. What are the key actions that are essential to help you adapt? Please list them.
- *Reform the resource management system*
 - *Set national direction on natural hazard risk management and climate adaptation through the National Planning Framework*
 - *Develop the emergency management workforce*
 - *Provide access to the latest climate projections data*
 - *Design and develop an Adaptation Information Portal*
 - *Produce guidance for dynamic adaptive pathways planning (DAPP)*
 - *Produce guidance on using different socio-economic scenarios for adaptation planning,*
 - *Regularly update adaptation guidance for local government*
 - *Produce guidance for preparing adaptation plans*
 - *Regularly update the guide to local climate change risk assessments*
 - *Produce guidance and tools for monitoring and evaluating the impact of adaptation initiatives*
 - *Produce an adaptation professional development programme for key practitioners*
 - *Explore additional interventions to mobilise investment*
 - *Public investment in climate change initiatives*
 - *Implement the Water Availability and Security programme*
 - *Invest in strengthening border biosecurity*
 - *Continue the National Interest Pest Responses programme*
 - *Deliver Jobs for Nature to restore indigenous ecosystems*
 - *Implement the Sustainable Land Management Hill Country Erosion Programme*
 - *Provide a forestry planning and advisory service*
 - *Prioritise nature-based solutions and implement Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 (ANZBS)*
 - *Build property resilience*
 - *Establish an initiative for resilient public housing*
 - *Embed adaptation in funding models for housing and urban development, and Māori housing*
 - *Ensure minimum regulatory requirements for buildings take into account future climate data*
 - *Integrate nature-based solutions into the urban environment*
 - *Scope a resilience standard or code for infrastructure*
 - *Integrate adaptation into Treasury decisions on infrastructure*
 - *Develop and implement the Waka Kotahi Climate Change Adaptation Action Plan*

- *Manage dry-year risk through the New Zealand Battery Project*
- *Encourage and support the evaluation of climate-related risks to landfills and contaminated sites*
- *Explore funding options to support the investigation and remediation of contaminated sites and landfills vulnerable to the effects of climate change*
- *Integrate adaptation into Waka Kotahi decision making*
- *Progress the rail network investment programme*
- *Invest in public transport and active transport*
- *Increase uptake of tools to invest in infrastructure in urban areas*
- *Support the integration of climate adaptation and mitigation in new and revised standards*
- *Develop the National Energy Strategy*
- *Raise awareness of climate-related hazards and how to prepare*
- *Develop the Health National Adaptation Plan (HNAP)*
- *Develop the Climate Migration Action Plan*
- *Building community resilience through social cohesion*
- *Strengthen teaching and learning related to climate change*
- *Improve natural hazard information on Land Information Memoranda (LIM)*
- *Connect communities to wider response and recovery support*
- *Assess healthcare service resilience*
- *Deliver the national Freight and Supply Chain strategy*
- *Support high-quality implementation of climate-related disclosures and explore expansion*
- *Develop options for home flood insurance issues*
- *Design and implement the Farm Monitoring Programme to determine farm performance*
- *Improve consumer understanding of property insurance pricing and risks*
- *Continue delivering the Sustainable Food and Fibre Futures Fund*
- *Identify the impacts of climate change on regional economies*

b. Which actions do you consider to be most urgent? Please list them.

- *Assess healthcare service resilience*
- *Develop options for home flood insurance issues*
- *Improve consumer understanding of property insurance pricing and risks*
- *Identify the impacts of climate change on regional economies*
- *Improve natural hazard information on Land Information Memoranda (LIM)*
- *Manage dry-year risk through the New Zealand Battery Project*
- *Progress the rail network investment programme*
- *Support the integration of climate adaptation and mitigation in new and revised standards*
- *Raise awareness of climate-related hazards and how to prepare*
- *Deliver the national Freight and Supply Chain strategy*
- *Set national direction on natural hazard risk management and climate adaptation through the National Planning Framework*
- *Provide access to the latest climate projections data*
- *Design and develop an Adaptation Information Portal*
- *Produce guidance on using different socio-economic scenarios for adaptation planning,*
- *Regularly update adaptation guidance for local government*
- *Regularly update the guide to local climate change risk assessments*
- *Produce guidance and tools for monitoring and evaluating the impact of adaptation initiatives*
- *Produce an adaptation professional development programme for key practitioners*
- *Implement the Water Availability and Security programme*
- *Implement the Sustainable Land Management Hill Country Erosion Programme*
- *Provide a forestry planning and advisory service*
- *Establish an initiative for resilient public housing*
- *Embed adaptation in funding models for housing and urban development, and Māori housing*
- *Ensure minimum regulatory requirements for buildings take into account future climate data*
- *Develop and implement the Waka Kotahi Climate Change Adaptation Action Plan*

c. Are there any actions that would help ensure that existing inequities are not exacerbated? Please list them.

- *Assess healthcare service resilience*

- *Develop options for home flood insurance issues*
- *Improve consumer understanding of property insurance pricing and risks*
- *Identify the impacts of climate change on regional economies*
- *Improve natural hazard information on Land Information Memoranda (LIM)*
- *Manage dry-year risk through the New Zealand Battery Project*
- *Progress the rail network investment programme*
- *Deliver the national Freight and Supply Chain strategy*
- *Design and develop an Adaptation Information Portal*
- *Produce guidance on using different socio-economic scenarios for adaptation planning,*
- *Regularly update adaptation guidance for local government*
- *Regularly update the guide to local climate change risk assessments*
- *Produce an adaptation professional development programme for key practitioners*
- *Implement the Water Availability and Security programme*
- *Implement the Sustainable Land Management Hill Country Erosion Programme*
- *Provide a forestry planning and advisory service*
- *Establish an initiative for resilient public housing*
- *Embed adaptation in funding models for housing and urban development, and Māori housing*
- *Develop and implement the Waka Kotahi Climate Change Adaptation Action Plan*

- d. Are there any actions not included in this draft national adaptation plan that would enable you to assess your risk and help you adapt?

No, the plan is comprehensive and if all actions are able to be completed, this will provide a good base from which to address our District's challenges.

4. Central government cannot bear all the risks and costs of adaptation. What role do you think asset owners, banks and insurers, the private sector, local government and central government should play in:

- a. improving resilience to the future impacts of climate change?

Everyone should play a role in this.

- b. sharing the costs of adaptation?

Asset owners need to be responsible with their assets, educating themselves on risks and taking steps to minimise their exposure. Local and central government need to be able to cover unpredicted/unplanned impacts and provide guidance. Costs should be open to market. Low-income ratepayers and those on benefits need additional support but more information is required from central government about what the potential options are and who will be funding each potential option.

5. The National Climate Change Risk Assessment recognised that there may be economic opportunities in adapting to a changing climate.
 - a. What opportunities do you think could exist for your community or sector?
 - *Farm planning – productivity increases*
 - *population increases*
 - *tourism increases*
 - b. What role could central government play in harnessing those opportunities?
Legislation-enabling, regulatory framework provision.

System-wide actions

In this section:

- [Why we need to take action](#)
- [What we want to achieve](#)
- How we will get there: [Focus area one: Reform institutions to be fit for a changing climate](#)
- How we will get there: [Focus area two: Provide data, information, tools and guidance to allow everyone to assess and reduce their own climate risks](#)
- How we will get there: [Focus area three: Embed climate resilience across government strategies and policies](#)

Why we need to take action

Our current systems and institutions – the legislation, tools and practices that we use to understand climate risk and to prepare for and respond to it – were designed for a more stable climate. The National Climate Change Risk Assessment (NCCRA) highlighted that:

- regulatory frameworks and institutions do not always account for changing risks
- there is a lack of statutory and policy alignment, a lack of coordination across government and with sectors, and climate information is scattered, and can be inconsistent and expensive
- there are limited tools and guidance on how to make decisions under conditions of uncertainty, such as the uncertainty associated with projections of future climate.

In 2018, the Climate Change Adaptation Technical Working Group (Working Group) made a series of recommendations to the Government. Some of these are now in place, such as the legislative framework that this national adaptation plan is part of.

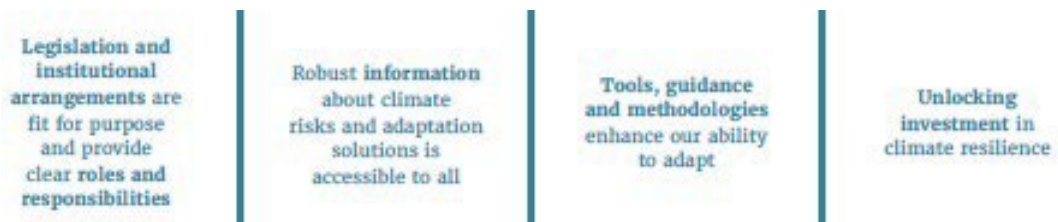
The Working Group also identified three characteristics that need to be in place across the system for Aotearoa New Zealand to adapt effectively:

- being informed about how the climate is changing and what this means for New Zealanders
- being organised, with a common goal, a planned approach, appropriate tools and clear roles and responsibilities
- taking dynamic action to proactively reduce exposure and vulnerability to the social, cultural, environmental and economic consequences of climate change.

What we want to achieve

Putting the right frameworks and settings in place and enabling everyone to assess and manage their own risks will establish the foundation for adaptation action in this first national adaptation plan.

The Government has set the following system-wide objectives for the first national adaptation plan



The actions that follow are designed to achieve these objectives. They also address the **governance risks** in the NCCRA, in particular the risks that:

- maladaptation will occur across all domains because they use practices, processes and tools that do not account for uncertainty and change over long timeframes
- climate change impacts across all domains will be made worse because current institutional arrangements are not fit for climate change adaptation.

Building climate resilience in diverse contexts requires a fresh approach to governance (Intergovernmental Panel on Climate Change, 2022).

What is governance?

Governance is about addressing collective issues, such as climate change. The NCCRA defines governance as: “the governing architecture and processes of interaction and decision making that exist in and between governments, economic and social institutions”.

Governance permeates all aspects of New Zealand, from Te Tiriti partnership between Māori and the Crown to the relationship between local government and communities, and from the economy to the built environment to natural ecosystems.

How we will get there

Focus area one: Reform institutions to be fit for a changing climate

Legislation and institutions are fit for purpose and provide clear roles and responsibilities

Extensive reforms to address system-wide challenges are already underway, including for resource management, three waters and emergency management.

These reforms will clarify roles and responsibilities, especially for local government and communities, and require long-term proactive planning that considers climate impacts and evolving and dynamic risks. Having clearer roles and responsibilities will also clarify the best way to share risks and costs across these groups.

These reforms underpin action to address all 10 of the most significant risks identified in the NCCRA.

Local government plays a central role in managing natural hazard risks, which the impacts of climate change are making worse.

A core function of councils under the Resource Management Act 1991 is to avoid or mitigate natural hazards, and councils must have particular regard to the effects of climate change when making decisions.

Councils also have responsibilities for civil defence and emergency management.

Local government provides a critical link between climate change adaptation policy and communities. It makes this link through its planning and emergency management functions and community engagements.

Critical actions

Reform the resource management system

Timeframe: Year 1 (2022/23) – **Lead agency:** MfE – **Relevant portfolio:** Environment – **Primarily supports:** Objective SW1 – **Status:** Current

In early 2021 the Government announced its intention to repeal the Resource Management Act 1991 and replace it with a Natural and Built Environments Act, a Strategic Planning Act and a Climate Adaptation Act. For more information on the proposed new Acts, see [Resource management system reform](#).

The Government's objectives for resource management reform include better preparation for adaptation and risks from natural hazards, and better mitigation of emissions contributing to climate change.

Resource management reform will play an essential role in supporting the resilience of homes, buildings and places, by encouraging planning for future growth and development in the right places and not in areas prone to climate-related hazards. The changes will require local government, central government, and iwi/Māori and communities to work together to plan how areas will adapt. The reform will provide tools to stop increasing exposure in areas of high or increasing risk and facilitate the retreat of communities, homes and infrastructure where risks are intolerable.

Among the changes that should enable long-term adaptation are:

- a National Planning Framework: strategic direction and guidance on how to achieve the climate outcomes in the Natural and Built Environments Act
- clear signalling or initiation of adaptation responses, including retreat through regional spatial strategies that identify risk zones and areas where adaptation may be necessary
- powers and processes to address ownership of property that is retreated from in the Climate Adaptation Act (or Natural and Built Environments Act)
- more comprehensive support for implementation.
- in 2023 we expect the Natural and Built Environments Act and the Strategic Planning Act to be passed.

Pass legislation to support managed retreat

Timeframe: Years 1–3 (2022–25) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change – **Primarily supports:** Objective SW1 – **Status:** Current

We will develop legislation to address complex technical, legal and financial issues associated with managed retreat as described by the Resource Management Review Panel. Managed retreat is an approach to reduce or eliminate exposure to intolerable risk, which enables people to strategically relocate assets, activities, and sites of cultural significance (to Māori and non-Māori) away from areas at risk from climate change and natural hazards within a planned period of time. This legislation is being progressed through the [development of the Climate Adaptation Act](#).

The government is expecting to introduce the Climate Adaptation Bill by the end of 2023, setting out the managed retreat framework.

Reform institutional arrangements for water services

Timeframe: Years 1–2 (2022–24) – **Lead agency:** DIA – **Relevant portfolio:** Local Government – **Primarily supports:** Objective SW1 – **Status:** Current

We will create new water entities that will work with councils and communities to deliver better health and wellbeing outcomes for our communities and protect our environment for generations to come. The NCCRA identifies risk to potable water as the most urgent risk from climate change. We are considering how the proposed new entities will manage climate risk. The reforms will bring a more consistent approach and more certainty about who makes decisions.

By July 2024, water services entities are established.

Modernise the emergency management system

Timeframe: Years 1–6 (2022–28) – **Lead agency:** NEMA – **Relevant portfolio:** Emergency Management – **Primarily supports:** Objective SW1 – **Status:** Current

We plan to modernise emergency management, including through legislative reforms, clearer roles and responsibilities and a strengthened partnership with Māori. This work seeks to improve the regulatory framework which underpins emergency management in New Zealand. This will also sharpen the focus on disproportionately impacted groups by strengthening community resilience to achieve more equitable outcomes.

By August 2024, there will be adoption of new EM legislation and improved guidance provided across the emergency management system.

The future for Local Government Review

Timeframe: Year 1 (2022/23) – **Lead agency:** DIA – **Relevant portfolio:** Local Government – **Primarily supports:** Objective SW1 – **Status:** Current

In 2021 the Minister of Local Government started an independent review into the future for local government.

Adaptation will bring new challenges and opportunities to local governance. We need to ensure the system of local government is equipped for agile, sustainable and anticipatory

decision making and implementation. The Review is likely to include recommendations on what local government does, how it does it and how it pays for it.

In April 2023, the Local Government Review Panel will provide the Minister with recommendations for improving the local governance system. Following this, the Government will decide how to respond to the Review's recommendations.

Supporting actions

Establish a foundation to work with Māori on climate actions

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change – **Primarily supports:** Objective SW1 – **Status:** Current

A platform will be developed to be a foundation for an equitable transition for Māori. It will deliver mechanisms for Māori to actively participate in policy design, tangata Māori climate actions, and support iwi/Māori to develop climate strategies and action plans for adaptation and mitigation. The platform will be built on three focus areas.

- Partnership and representation. To uphold Te Tiriti and establish a constructive relationship with Māori, the platform will enable strategic input from Māori and more equitable governance arrangements over the emissions reduction plan and the national adaptation plan.
- Strategy and alignment. To support a Māori-led transition and elevate te ao Māori within the climate response, Māori will have support to define, measure and implement a national Māori climate strategy and action plan.
- Community activation. Funding will support kaupapa Māori, tangata Māori actions and solutions for the climate emergency.

Set national direction on natural hazard risk management and climate adaptation through the National Planning Framework

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MfE – **Relevant portfolio:** Environment – **Primarily supports:** Objective SW1 – **Status:** Current

The National Planning Framework will set clear direction for local authorities to guide them in how to achieve the climate resilience outcomes in the Natural and Built Environments Act. This will set out methods and requirements for planning for natural hazards and considering future climate risks. This direction will be integrated with direction on other outcomes across the natural and built domains.

Implement the National Disaster Resilience Strategy

Timeframe: Years 1–6 (2022–28) – **Lead agency:** NEMA – **Relevant portfolio:** Emergency Management – **Primarily supports:** Objective SW1 – **Status:** Current

We will design a pathway to give effect to the National Disaster Resilience Strategy's vision, goals and objectives. The Strategy's vision is for a disaster-resilient nation that acts proactively to manage risks and build resilience in a way that contributes to the wellbeing and prosperity of all New Zealanders.

Develop the emergency management workforce

Timeframe: Years 1–6 (2022–28) – **Lead agency:** NEMA – **Relevant portfolio:** Emergency Management – **Primarily supports:** Objective SW1 – **Status:** Current

Work is ongoing to expand the operational capacity and capability of the emergency management workforce at the national, regional and local levels. This will better position New Zealand to address the increased frequency and severity of natural hazards.

Establish central government oversight and coordination for implementing the national adaptation plan

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change – **Primarily supports:** Objective SW1 – **Status:** Current

This will provide transparency of implementation of the national adaptation plan across government, improve coordination within central government, and enable accountability.

How we will get there

Focus area two: Provide data, information, tools and guidance to enable everyone to assess and reduce their own climate risks

Robust information about climate risks and adaptation solutions are accessible to all

We already have a significant amount of information on how the climate is expected to change in New Zealand, and the consequences of those changes.

However, the way it is collected and managed is inconsistent across the system, and it can be hard to find and use. We also need datasets that better respond to iwi, hapū and Māori needs for information.

With access to up-to-date and relevant information about climate risks, people can better assess and reduce their own climate risk and develop adaptation solutions.

Data need to be combined to provide meaningful risk information in different contexts.

Climate data include current and expected biophysical changes such as changes to temperature, sea level and precipitation. With geospatial data, it is possible to map current and projected impacts and build baselines for long-term analysis – such as light detection and ranging (LIDAR), Earth observations, and topographic and geographic data.

When combined, these data can help to generate modelling and scenario-planning tools tailored to the needs of different users. With those tools, users can then assess climate consequences in areas such as health, employment, food security, tourism, businesses, and terrestrial and freshwater ecosystems.

Tools, guidance and methodologies enhance our ability to adapt

We will never have perfect information on climate change until it is too late to act. Managing risk means we need to make decisions despite uncertainty and consider the worst-possible outcome to prepare as well as we can. We need more than just good information to effectively assess risk and take appropriate action.

When we have the right tools, guidance and methodologies, we can use information to manage climate risks, while allowing for uncertainty when planning for future risk. This includes arranging for finance, which is a key tool for enabling adaptation.

Unlocking investment in climate resilience

Early investment from all actors can help, in many cases, to avoid significant losses and to increase our climate resilience. Central government has an important role in encouraging other actors to manage their risks, and ensuring the right incentives are in place.

The cross-cutting actions in focus area two support this objective. Having clarity on the Government's long-term strategy for adaptation, ongoing system reform, and roles and responsibilities across the system will be the critical foundation for high-value investment. Better data and information can support decisions on where and when to invest in adaptation actions that offer the best value.

However, in some cases affordability, access to finance or other market barriers may prevent timely, cost-effective action.

By the end of 2024, as system reforms are completed and New Zealanders have better information about how to manage their climate risks, the Government will consider the need for further tools or guidance, funding and investment mechanisms to catalyse investment in resilience.

Realising the benefits of climate investment

There are several groups who each have responsibilities for adaptation. They bear costs and risks from climate change, and will therefore benefit from investment in adaptation. For example:

- Asset owners, such as homeowners and business owners, can buy insurance to transfer risk. Outside of their insurance coverage, they ultimately bear the costs of any loss or damage to their assets. Equally, they receive the benefits from investing in risk reduction, such as an increase in asset value.
- Banks and insurers may be exposed to climate risk through their mortgage portfolios and liabilities (see Economy and Financial Systems Chapter). By investing in resilience measures and supporting customers to do the same, banks and insurers can reduce their exposure, and therefore reduce potential losses.
- The private sector will likely face physical and transition challenges from climate change. Businesses may also find economic opportunities from better managing their climate risks, such as benefitting from new technologies and markets. Investment in resilience can reduce their risks and create new opportunities.
- Local government currently has a significant role in managing climate risks. Improved resilience can reduce the costs of new and improved infrastructure, support the ability of communities to pay rates, and reduce the likelihood of high-cost interventions like managed retreat.

- Central government provides post-disaster relief funding through mechanisms like the Earthquake Commission and NEMA. It also provides support for vulnerable individuals through the welfare system. Increased resilience across the country can help the Government to manage those costs, as well as the costs of maintaining its own assets and infrastructure, such as schools, hospitals, police stations, and prisons.

The benefits of greater resilience will be shared across society, so the cost should be shared equitably too.

Case study: Wellington uses its digital twin to present climate adaptation

A digital twin is a visual representation that looks and behaves like the real world; it can be used to improve decision making. As humans mostly process information visually, the digital twin helps people understand how a location works, how it will fare as the climate changes and what the outcomes of policy decisions will be.

Wellington City Council has developed a digital twin that functions as an interactive, hyper-realistic virtual model of the capital. Built from a wide range of data sources – including GIS maps and city-wide sensors – it can be used to display the past, present and future city.

The Council is now using this digital twin to co-design climate change adaptation solutions with Wellingtonians. The technology will connect mātauranga Māori, city planning data, climate science and community values with council decision-making processes, to allow the Council to make adaptation decisions in line with community priorities.

The project will communicate the complexities of climate impacts and adaptation planning in an accessible way. The approach encourages participation as decision makers and other Wellingtonians will be able to clearly understand local climate change impacts.

Because using the digital twin and its code will be free, the project will empower indigenous communities, businesses and organisations in Wellington to adapt together.

Critical actions

Provide access to the latest climate projections data

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MBIE – **Relevant portfolio:** Building and Construction – **Primarily supports:** Objective SW2 – **Status:** Current

The National Institute of Water and Atmospheric Research (NIWA) Projections Project is working to make the global climate projections from the most recent Intergovernmental Panel on Climate Change (IPCC) report (AR6 – WG1) more applicable to New Zealand. This will provide New Zealanders with the regional and local climate projections data they need to assess future climate risk and make adaptation decisions.

By June 2024, national climate projection datasets for New Zealand are made available and deliver a product that enables end-users to appropriately measure climate change risk.

Design and develop an Adaptation Information Portal

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change – **Primarily supports:** Objective SW2 – **Status:** Current

The Adaptation Information Portal will be a national hub of all available climate data and information. One aspect of the portal will be to collate information, including mātauranga Māori (where appropriate), for iwi/Māori climate decisions. New Zealanders will be able to understand and assess their climate risk, find solutions and share best practices.

The design of the portal will carefully consider other related initiatives, such as the Earthquake Commission’s (EQC’s) Risk and Resilience Portal (which will provide public information on natural hazard risk – including natural hazards exacerbated by climate change). The Ministry for the Environment (MfE) will work with EQC on a joint approach to making more natural hazard and climate data available to the public in an aligned and consistent way.

By the end of 2023, a design scope and delivery plan will be complete and user needs defined.

Complete case study to explore co-investment for flood protection

Timeframe: Years 1 (2022) – **Lead agency:** DIA – **Relevant portfolio:** Local Government – **Primarily supports:** objective SW2 – **Status:** current

DIA are working with NEMA, the West Coast Regional Council, the Buller District Council and local iwi to explore options to increase flood resilience in Westport. This case study will focus on the funding and financing challenges facing small local authorities and vulnerable communities in funding flood risk management. It will also highlight the challenges of repeat flood events and the impacts of climate change on an existing community located on a flood plain which has limited flood defences in place. The current situation in Westport is described below.

By June 2022, Ministers will receive a strategic business case from Buller District Council and West Coast Regional Council on a package of flood resilience options to reduce flood risk in Westport.

Case study: Adapting to flood risk in Westport – investing in flood resilience

Westport will need to adapt to a changing climate

The Westport community is facing significant challenges in adapting to the effects of flooding and climate change. Severe flooding in July 2021 and February 2022 caused widespread damage to homes and infrastructure, and the Buller District Council required central-government funding to help with the recovery.

The July 2021 event was the largest direct measurement of a river flow ever recorded in New Zealand. It flooded over 400 houses, incurred insurance costs of around NZ\$56 million, and made it necessary to develop an area for temporary housing for those who could not return to their homes.

Modelling suggests the Westport community is at high risk of future flooding – with climate change expected to increase the frequency and severity of these events. The repeat flooding events have heightened community concerns about the need to reduce flood risk and protect assets and livelihoods.

Investing in risk reduction is key to building Westport's climate resilience

An important adaptation action is investing more in flood risk reduction; for every NZ\$1 invested in flood protection schemes, there can be at least a NZ\$6 return on investment. A number of risk reduction initiatives are underway locally – the West Coast Regional Council is developing a flood protection scheme; the combined district plan (Te Tai o Poutini Plan) proposes rezoning land to residential in less flood-prone areas together with minimum floor heights; and a local-level climate risk assessment and climate adaptation plan for the Buller District has been initiated.

But the community faces some significant challenges

Adaptation is complex and can be expensive. Local ability to fund adaptation and flood protection is likely to be a challenge, as many among the population have very low incomes, as measured by the socio-economic deprivation index. Meeting these costs may be beyond the financial capacity of the ratepayers and councils.

New funding and financing models could share costs more equitably

Central government (through the Department of Internal Affairs (DIA) and the National Emergency Management Agency (NEMA)) is partnering with local councils and iwi to explore new funding and financing models for co-investing in flood risk reduction and climate adaptation for the Westport community. This work includes looking at how costs could be more equitably shared between central and local government, and between the community, private sector and other asset owners.

Importance of case studies

Undertaking climate adaptation case studies or pilot projects can provide significant lessons and benefits for other communities and councils facing similar adaptation challenges around New Zealand. Case studies bring climate change challenges to life by demonstrating what increased sea levels and more frequent and intense flood events mean for existing settlements. They demonstrate the need for a spectrum of risk reduction options to be considered and refined according to a set of evaluation criteria agreed locally. Some options might not be technically feasible, and others might not be affordable or acceptable to local communities. The importance of sequencing and interdependence of options can also be highlighted through the case studies – with some actions being short-term and others, particularly those relating to land use planning (eg relocation or retreat) requiring longer-term solutions when appropriate regulatory mechanisms are in place.

Most of all, adaptation case studies will provide an opportunity to engage with local communities on climate change issues – to better understand climate change impacts and when they will happen, to identify possible mitigation actions and estimated costs, and to work through how risk reduction actions might be funded. Case studies can also highlight how wider central government policy initiatives and reforms will play out locally to achieve better adaptation outcomes.

Deliver a rolling programme of targeted guidance

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change – **Primarily supports:** Objective SW3 – **Status:** Current/proposed

Roll out a programme of non-statutory guidance to enable decision makers to assess and plan to manage climate-related risks (see table 3). Some of this guidance could also support regulatory requirements to be developed through the National Planning Framework.

Table 3: Programme of adaptation guidance

Guidance document	Timeframe (year)		
	1–2	3–4	5–6
<p><i>Promote the use of the New Zealand Climate Change Projections guidance</i></p> <p>A climate impacts update for New Zealand that highlights changes from the AR6 IPCC² report enables stakeholders to assess quickly where changes to their risk management plans may need to account for the latest science.</p>			
<p><i>Produce adaptation guidance for central government policy makers</i></p> <p>A methodology for central government to ensure they consider adaptation in new policy and services to avoid increase exposure or vulnerability to climate impacts.</p>			
<p><i>Produce guidance for dynamic adaptive pathways planning (DAPP)</i></p> <p>A guide for central and local government on how to plan for adaptation in a context of uncertain climate futures.</p>			
<p><i>Produce guidance on using different socio-economic scenarios for adaptation planning</i></p> <p>Assists central/local government and businesses to consider future socio-economic scenarios when assessing climate risks and planning how to manage them.</p>			
<p><i>Regularly update adaptation guidance for local government</i></p> <p>Supports local government to consider adaptation in planning and decisions.</p>			
<p><i>Produce guidance on integrating mātauranga Māori into adaptive planning and working with mana whenua</i></p> <p>This will help central and local government effectively engage with iwi/Māori when managing risk and planning for adaptation.</p>			
<p><i>Produce guidance for preparing adaptation plans</i></p> <p>This will enable different audiences, sectors and levels of government to produce their own adaptation plans, using a standard approach to planning under conditions of uncertainty in projections of future climate.</p>			
<p><i>Regularly update the guide to local climate change risk assessments</i></p> <p>This guide sets out a step-by-step process for local risk assessments. It will be updated on a six-yearly cycle following the release of each NCCRA, and supports local government to conduct their own assessments, to better understand the risks their regions face.</p>			

² IPCC. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Supporting actions

Complete the Data Investment Plan project

Timeframe: Years 1–6 (2022–28) – **Lead agency:** Stats NZ – **Relevant portfolio:** Statistics –
Primarily supports: Objective SW2 – **Status:** Current

The project recently completed a stocktake of essential datasets across central government and prioritised data gaps for investment. Climate data gaps may be filled by acquiring new data or making existing data fit for purpose.

Develop Future Pathways for the Research, Science and Innovation System programme

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MBIE – **Relevant portfolio:** Research, Science and Innovation – **Primarily supports:** Objective SW2 – **Status:** Current

The Future Pathways for the research, science and innovation System programme will position the system for the future. This includes focusing resources on national goals, such as climate change, and addressing other issues facing the research system, such how best to honour Te Tiriti obligations, system funding and incentives, workforce and institutional design.

Improve how science, data and knowledge is used to inform emergency management

Timeframe: Years 1–6 (2022–28) – **Lead agency:** NEMA – **Relevant portfolio:** Emergency Management – **Primarily supports:** Objective SW2 – **Status:** Current

NEMA's 2021 Science Strategy will be used to create a framework for scientific engagement, promotion and influence for risk reduction, readiness, response and recovery. Research, data, mātauranga Māori, local knowledge and technical expertise will inform strategic decisions on emergency management and explore practical interventions to improve disaster resilience.

Future work programme proposals

Develop 3D coastal mapping

Timeframe: Years 1–2 (2022–24) – **Lead agency:** LINZ – **Relevant portfolio:** Land Information –
Primarily supports: Objective SW2 – **Status:** Proposed

Coastal mapping comprises detailed 3D mapping of the coastal zone and the upgrade and addition of Global Navigation Satellite System (GNSS) sites in the coastal zone to assess the impacts of sea-level rise and model the impacts of tsunamis and storm surges on communities, infrastructure and biodiversity.

Implement the programme: Climate Crisis - Defence Readiness and Response

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MOD – **Relevant portfolio:** Defence –
Primarily supports: Objective SW2 – **Status:** Proposed

This Defence assessment explores the links between climate change and security, and how climate change will be a driver for future Defence Force operations. It identifies actions Defence can take as part of a broader government programme on climate change and sustainability. It underscores the importance of working with and learning from our Pacific partners, to understand and respond to intensifying climate impacts.

Produce new tools and guidance specific to mātauranga Māori and mātauranga indicators

Timeframe: Years 3–4 (2024–26) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change –
Primarily supports: Objective SW2 – **Status:** Proposed

These resources will be developed in partnership with iwi/Māori, to assist iwi/Māori to take action in their communities and to inform decisions. This action will provide targeted guidance on planning in uncertain conditions.

Produce guidance and tools for monitoring and evaluating the impact of adaptation initiatives

Timeframe: Year 3 (2024/25) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change –
Primarily supports: Objective SW2 – **Status:** Proposed

This will help ensure that adaptation actions effectively increase our resilience and manage the risks we face. Monitoring is essential to an effective plan, and this guidance will help users identify signals that an action is no longer meeting its objectives.

Produce an adaptation professional development programme for key practitioners

Timeframe: Years 4–5 (2025–27) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change –
Primarily supports: Objective SW2 – **Status:** Proposed

This will target building capability and will help to diffuse new tools and guidance among different audiences. It will encourage uptake and effective use by practitioners.

Explore definitional tools to support greater investment

Timeframe: Years 1–3 (2022–25) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change –
Primarily supports: Objective SW2 – **Status:** Proposed

This will explore the potential benefits of a 'green' taxonomy to identify a common definition of climate positive investments. This could help support and guide businesses investing in both adaptation and mitigation to protect against greenwash and – if aligned with international best practice – could support greater international investment in New Zealand's climate-resilient projects.

Explore additional interventions to mobilise investment

Timeframe: Years 3–5 (2024–27) – **Lead agency:** MfE – **Relevant portfolio:** Climate Change –
Primarily supports: Objective SW2 – **Status:** Proposed

The Government intends to review the national adaptation plan in years 2 and 4 to assess progress and gaps. Alongside this, the Government will consider what further steps may be needed to support investment in resilience.

Case study: Hawke's Bay and the Clifton to Tangoio Coastal Hazards Strategy 2120

Coastal communities around New Zealand are increasingly affected by hazards like coastal inundation (flooding by the sea) and coastal erosion. The Hawke's Bay region is considered to have one of the highest levels of coastal risk exposure. Natural disasters, storms, coastal erosion and inundation along the region's 353-kilometre coastline continue to damage property and threaten people's safety and wellbeing.

In developing the Clifton to Tangoio Coastal Hazards Strategy 2120, the Hawke's Bay Regional Council, Hastings District Council and Napier City Council have worked with local iwi and coastal community representatives to take a proactive, locally led approach to identifying and responding to coastal hazards over the next 100 years. It has been an opportunity for councils to work together on a complex cross-boundary issue to address ongoing community concerns.

The strategy identifies coastline areas that may be affected by coastal hazards over the short- to long-term, and the risks to public and private property, cultural sites and areas, recreation and infrastructure services. It uses the dynamic adaptive pathways planning (DAPP) framework, which presents adaptation solutions as one option in a series of future pathways.

Further work is needed to answer fundamental questions about how to share costs of proposed adaptation solutions, and where to allocate the roles and responsibilities for implementing the strategy.

How we will get there

Focus area three: Embed climate resilience across government strategies and policies

To adapt to the future impacts of climate change, we will need to make adjustments to how we do things in every aspect of the way we live our lives.

The national adaptation plan is a whole-of-government action plan. The sections that follow set out how the Government will adapt our work programmes to embed climate risk in our approach to them.

Many of the actions that this plan describes are interrelated and will help to address multiple risks. This reflects the interconnected nature of climate issues. It also underscores the importance of taking a flexible approach to the future work programme.

These action plans have been designed to follow an iterative process, which involves developing plans, implementing them, assessing progress and updating the plans to make them fit for the new context. This reflects adaptative planning in action.

Te Tiriti principles

The outcomes and actions in this area reflect Te Tiriti principles of partnership, protection and participation.

- Iwi/Māori interests are not disproportionately harmed impacted and/or inequities exacerbated. This includes impacts on Māori cultural heritage sites, their land and associated cultural and spiritual connections; and the role of Māori as kaitiaki.
- Iwi/Māori and the Crown will work together to build a more resilient New Zealand by adapting early to reduce climate risks in sectors most vulnerable to near-term or significant change. In particular, this work will focus on:
 - developing mātauranga Māori indicators across the environment
 - public housing – joint urban design and construction projects and the use of Māori design principles
 - Iwi/Māori working alongside government to reduce vulnerability of their communities, to strengthen resilience and to ensure participation across transport, business, community, lifeline services, remediation of landfills, and in times of emergency
 - Iwi/Māori realising their economic aspirations through innovation and by Māori businesses assessing climate risks and capitalising on climate-resilient opportunities.

Critical actions

Public investment in climate change initiatives

Timeframe: Years 1–6 (2022–28) – **Lead agency:** Treasury – **Relevant portfolio:** Finance – **Primarily supports:** Objective SW3 – **Status:** Current

The government is supporting climate change objectives through its approach to the public finance system. This includes the establishment of the Climate Emergency Response Fund (CERF) and our Sovereign Green Bond (Green Bond) programme.

In 2021, the Government established the CERF with an initial \$4.5 billion down payment, funded with cash proceeds from the New Zealand Emissions Trading Scheme (NZ ETS).

Government agencies can submit bids to the CERF, primarily through the annual Budget process, to access funding to support climate change initiatives.

In Budget 2022 the CERF was focused on the Emissions Reduction Plan, but for future Budgets the Government may consider extending the scope of the CERF to fund measures to support adaptation to the changing climate.

In November 2021 the Government announced plans to issue Sovereign Green Bonds (Green Bonds) from 2022 onwards. Green Bonds provide financing for low-emission or environmental projects. Money raised from the Green Bonds will be used to support projects that help reach our climate objectives. Subject to market conditions and progress of establishment activity, final details of the Green Bond programme will be announced mid 2022 and then Green Bonds will be issued in late 2022.

Ongoing regulatory stewardship

Timeframe: Years 1–6 (2022–28) – **Lead agencies:** All – **Relevant portfolios:** All – **primarily supports:** Objective SW3 – **Status:** Current

A regulatory system is a set of formal and informal rules, norms and sanctions. Examples include the regulations for labour markets, commerce and financial markets, and building and construction codes.

Regulatory stewardship is the process of government agencies governing and monitoring these systems.³ It also requires robust analysis of any changes so that these systems remain fit for purpose. This creates an opportunity to consider climate change as part of routine updates to regulations.

System-wide actions questions

6. Do you agree with the objectives in this chapter?
Yes

7. What else should guide the whole-of-government approach to help New Zealand adapt and build resilience to a changing climate?
Economic planning to assist us to understand of how we will afford these actions.

8. Do you agree that the new tools, guidance, and methodologies set out in this chapter will be useful for you, your community and/or iwi and hapū, business or organisation to assess climate risks and plan for adaptation?
Yes

9. Are there other actions central government should consider to:
 - a. enable you to access and understand the information you need to adapt to climate change?
No

³ Section 32(1)(d) of the State Sector Act 1988 makes departmental chief executives responsible for the stewardship of the legislation administered by their agencies.

Please explain your answer.

We agree that it must be legislated that any climate hazards to a property must be identified clearly on LIMs.

b. provide further tools, guidance and methodologies to assist you to adapt to climate change?

None identified at this stage.

c. remove barriers to greater investment in climate resilience?

None identified at this stage.

d. support local planning and risk reduction measures while the resource management and emergency management system reforms progress?

None identified at this stage.

10. What actions do you think will have the most widespread and long-term benefit for New Zealand?

- *Pass legislation to support managed retreat.*
- *Adjust the ETS to ensure maximum carbon credits can be obtained for adaptation measures that also mitigate emissions.*
- *Deliver the freshwater program.*
- *Linking/developing the green corridors – win/win with carbon credits, land use change prevention and biodiversity support.*

11. Are there additional actions that would strengthen climate resilience?

Yes

Please explain your answer.

There needs to be investigation into ways to manage the dual risk of flooding and drought through better water management. Our ratepayers/farmers need support to build off-stream dams, water supply reticulation for animals, plantings for wetlands to mitigate flooding and erosion. More investigation is required into the win/win opportunities for our farmers to get carbon credits and improve flood/drought resilience.

12. There are several Government reform programmes underway that can address some barriers to adaptation, including the Resource Management (RM) reform. Are there any additional actions that we could include in the national adaptation plan that would help to address barriers in the short-term before we transition to a new resource management system?

Resource consents at on-farm level are permissible with the development of an agreed farm plan. Resource consents are difficult and litigious at present in our district, and there is no consideration of the adaptation benefits that such development could bring.

13. In addition to clarifying roles and providing data, information, tools and guidance, how can central government unlock greater investment in resilience?

- a. Would a taxonomy of 'green activities' for New Zealand help to unlock investment for climate resilience?

Yes

Please explain your answer.

Carbon credits are locked into large scale delivery e.g., Air New Zealand buying whole farms. We need a mechanism that enables green enhancements across both private owned land and public land e.g., river margins and bush remnants and farm plans.

The types of crops grown could be incentivised so that we are more drought resilient and acquire co-benefits. Carbon food miles need to be acknowledged, and it needs to be reflected in the provision of groceries in local areas.

Natural environment

In this section:

- [Why we need to take action](#)
- [What we want to achieve](#)
- [How we will get there](#)
- [Actions across other outcome areas also build the resilience of the natural environment](#)

Why we need to take action

The natural environment encompasses indigenous and non-indigenous species in natural and modified terrestrial, freshwater and marine environments. It includes all ecosystems in environments from the mountains, lakes and rivers to native forests, coasts, oceans and farmlands.

Due to our geographical isolation, many of Aotearoa New Zealand's indigenous plants and wildlife exist nowhere else on Earth: we have a unique diversity of species.

Our taonga species and ecosystems⁴ make a significant contribution to global biodiversity and underpin the way we are seen worldwide. Internationally, the biodiversity crisis and the climate crisis have been acknowledged to be closely linked.

All aspects of life in New Zealand rely on a thriving natural environment. It is essential for our physical and mental health, food and water security, culture and economy. The natural environment contributes to climate resilience by buffering climate impacts, improving wellbeing and sequestering carbon.

These linkages are acknowledged in Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020.⁵

From the perspective of te ao Māori, the natural environment is interconnected through genealogical links to all facets of the environment, including Papatūānuku (earth mother), Ranginui (sky father), Tāne mahuta (forests), Tangaroa (sea) and other cultural domains. When the environment is unwell, this affects our health and wellbeing.

Climate change puts pressure on our coastal ecosystems

New Zealand's coastal ecosystems and species are vulnerable to gradual and extreme changes in climate. Sea-level rise puts pressure on coastal ecosystems and forces them to move inland where possible.

Subdivisions and urban development reduce the availability of sites for landward migration by ecosystems and species as sea levels rise, and cause bird habitat loss.

⁴ Endemic to New Zealand are unique species of bat, frog and insect, ancient tuatara, flightless birds and beech forests.

⁵ www.doc.govt.nz/nature/biodiversity/aotearoa-new-zealand-biodiversity-strategy

Although coastal ecosystems tend to adapt well to the natural hazards they are exposed to, the increase in frequency and intensity of climate events gives them less time to recover.

Reducing human pressures and planning for ecosystem corridors are the best ways to enable coastal ecosystems to respond to climate change.

Climate change aids the spread of pests and diseases

Our natural systems are already under pressure from exotic pests and diseases, which threaten indigenous biodiversity and species crucial to trade. Climate change increases the chance of established pests spreading further, growing faster and having greater impacts. It also increases the risk of new invasive pests and diseases becoming established.

By strengthening our biosecurity system, we will be able to identify and manage the risks from new and established pests early. Identifying areas and species vulnerable to shifts in pest distribution will also help manage this risk.

Loss of resilience in natural systems will have far-reaching impacts on iwi/Māori

Climate risks in the natural environment affect Māori cultural, economic and spiritual wellbeing. Climate change will affect culture and customs relating to mahinga kai (food-gathering sites) and urupā (burial grounds), as well as economic opportunities through cascading impacts on tourism and agriculture. The loss of vulnerable species and ecosystems will disturb relationships Māori have with these living taonga.

Case study: Queensland fruit fly

In future, climate change is likely to create conditions that enable the Queensland fruit fly (Q-fly) to establish in New Zealand. This insect pest can cause serious harm, making over 100 types of fruits and vegetables inedible, and is seen as one of the most significant biosecurity threats to New Zealand's horticultural industries.

In 2015, a breeding population of Q-fly was detected in Auckland. The ongoing network of surveillance traps (since 1986) has proven effective in detecting Q-fly early in New Zealand, enabling a quick and immediate response to minimise the impacts on our environment and trade. About 7,900 traps in the national surveillance network are placed throughout the country, in locations where there is a high risk that Q-fly will enter and become established. A Q-fly population has not re-established since this initiative began.

This case study shows how important ongoing research is in providing information on how to conduct surveillance programmes (including climate considerations) that will inform future decision making.

What we want to achieve

Climate-resilient ecosystems are healthy and diverse.

The natural environment has high ecological integrity because human-induced pressure has eased and restoration efforts have been successful. It also has room to move across landscapes as the climate changes. By understanding the impacts of these changes and reducing pressures, we give ecosystems more time to adjust to new climate threats.

When ecosystems are healthy, they can provide a range of benefits that enrich our quality of life. Nature-based solutions buffer against climate impacts, while also fostering wellbeing, sequestering carbon and increasing biodiversity.

When we have ecosystems that are healthy and connected, and where biodiversity is thriving (**objective NE1**), that means:

- biodiversity, ecosystems and dynamic land and sea environments are strengthened
- ecosystem health improves, ecosystems and species have room to move, and human pressures reduced
- the natural environment can best to respond to climate impacts if it is intact and connected. Its natural diversity, and its ecological and physical processes, are supported and enhanced.

Robust biosecurity reduces the risk of new pests and diseases spreading (**objective NE2**). This means:

- plants and animals are more resilient, through the control of invasive pests and diseases, and the risk of these establishing and spreading is reduced.

Support for working with nature to build climate resilience (**objective NE3**) means:

- restoring and protecting indigenous ecosystems, identifying sites that need buffers against climate risks and supporting communities in understanding nature-based solution as a choice for adaptation.

The actions that follow are designed to achieve these objectives and address the **natural environment risks** in the National Climate Change Risk Assessment (NCCRA). In particular, they address the risks to:

- risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea-level rise and extreme weather events
- risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.

How we will get there

Critical actions

Implement the DOC Climate Change Adaptation Action Plan

Timeframe: Years 1–4 (2022–25) – **Lead agency:** DOC – **Relevant portfolio:** Conservation – **Primarily supports:** Objective NE1 – **Status:** Current

The Department of Conservation's (DOC's) Climate Change Adaptation Action Plan (CCAAP) sets out a medium-term action plan which aims to implement suitable adaptation actions. It applies to conservation land and New Zealand's coastal areas, public conservation land, marine protected areas and threatened native species and systems.

The plan aims to assess ecosystem and species vulnerability to climate impacts, and the adaptation actions that should occur to enhance their resilience. Possible adaptation actions include translocating climate vulnerable species or pest control to improve the resilience of native ecosystems.

By 2024, a reporting framework on the implementation of the CCAAP will be in place. DOC adaptation work progress against the framework will be reported on.

Implement the proposed National Policy Statement on Indigenous Biodiversity

Timeframe: Years 1–6 (2022–28) – **Lead agencies:** MfE, DOC – **Relevant portfolios:** Environment; Conservation – **Primarily supports:** Objective NE1 – **Status:** Current

The regulatory arm of Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 is the National Policy Statement for Indigenous Biodiversity (NPS IB), which is currently under development.

Through the NPS IB, councils and landowners must consider creating ecological corridors in response to climate change.

Protections for indigenous biodiversity will be transitioned into the resource management reform in 2023. This will be a new opportunity to bring in specific adaptation policies for biodiversity and ecosystem conservation across New Zealand.

By August 2024, the National Policy Statement for Indigenous Biodiversity is ratified and implementation has begun.

Implement the Water Availability and Security programme

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MPI (MfE support) – **Relevant portfolio:** Agriculture – **Primarily supports:** Objective NE1 – **Status:** Current

As climate change increases water variability across the country, the availability of freshwater is of key concern to the primary sector and rural communities. The Water Availability and Security programme will help restore and maintain the health of waterways, taking its lead from the National Policy Statement on Freshwater Management 6.

It will help primary sector businesses and rural communities adapt to increasingly variable natural water availability through a range of complementary activities to both reduce demand and make best use of available water.

By 2024, the Ministry for Primary Industries (MPI) will form a permanent team and commence addressing issues of water availability and security within our primary sectors and rural communities.

This work will include partnering with Māori, communities and other impacted sectors to deliver multi-purpose, multi-benefit solutions.

Deliver a collection of actions run by Biosecurity New Zealand

The following actions address risks to indigenous ecosystems and species that result from the greater spread, survival and establishment of invasive species. They also help build climate resilience of ecosystems generally.

⁶ Ministry for the Environment. 2020. *National policy statement for freshwater management*. Wellington: Ministry for the Environment.

Biosecurity actions for climate adaptation	Timeframe (year)		
	1–2	3–4	5–6
<p><i>Pilot the on-farm biosecurity programme</i></p> <p>Timeframe: Years 1–2 (2023–24) – Lead agency: MPI – Relevant portfolio: Biosecurity – Primarily supports: Objective NE2 – Status: Current</p> <p>This programme aims to improve biosecurity outcomes on dairy, sheep and beef farms and create a more resilient biosecurity system. It is responsible for developing and implementing an action plan to overcome barriers and increase voluntary on-farm biosecurity practices.</p>			
<p><i>Invest in strengthening border biosecurity</i></p> <p>Timeframe: Years 1–6 (2022–2028) – Lead agency: MPI/NZ Customs – Relevant portfolio: Biosecurity – Primarily supports: Objective NE2 – Status: Current</p> <p>Two significant projects (Sea Cargo Programme and Mail Pathways Project) by Biosecurity New Zealand will improve our ability to address the biosecurity risk from mail and sea cargo pathways. These projects will protect biodiversity through identifying pest species that arrive through our international borders.</p> <p>This initiative will allow MPI to fund one real-time tomography (RTT) 3D scanner and two other technology solutions, artificial intelligence algorithms and advanced data systems to screen incoming mail and parcels for biosecurity risks.</p>			
<p><i>Continue the Freshwater Biosecurity Partnership Programme</i></p> <p>Timeframe: Years 1–6 (2022–28) – Lead agency: MPI – Relevant portfolio: Biosecurity – Primarily supports: Objective NE2 – Status: Current</p> <p>MPI leads the Freshwater Biosecurity Partnership Programme in partnership with the Department of Conservation, Fish and Game NZ, specific Māori entities, regional councils, Land Information New Zealand and various industry groups including Genesis Energy and Meridian Energy. The vision of the Programme is to take a collaborative action to protect New Zealand’s freshwater from the impacts of freshwater pests.</p> <p>Focus areas for the partnership include:</p> <ul style="list-style-type: none"> • Increasing knowledge of freshwater domestic pathways of spread and development of new detection and control tools • Maintaining systems and processes to support effective and co-ordinated operational delivery • Effective engagement and use of behavioural change tools including the Check Clean Dry campaign - a national social marketing campaign aimed at preventing the spread of freshwater pests. <p>Effective early detection and control tools will become even more important in a changing climate where more waterways could become suitable for freshwater pests. Better information about the distribution of freshwater pests will allow the CCD to be targeted to the highest risk locations/pathways/activities.</p>			
<p><i>Prevent the spread of wilding conifers, and contain or eradicate established areas of wilding conifers by 2030</i></p> <p>Timeframe: Years 1–6 (2022–28) – Lead agency: MPI – Relevant portfolio: Biosecurity – Primarily supports: Objective NE2 – Status: Current</p> <p>Established in 2016, this programme ensures a collaborative, coordinated and effective national approach to wilding conifers. This reduces fire risk arising from dense forests without appropriate fire breaks, improves water availability (including for hydro), prevents the loss of land from production, and preserves biodiversity of indigenous ecosystems.</p>			

Biosecurity actions for climate adaptation	Timeframe (year)		
	1–2	3–4	5–6
<p><i>Continue the National Interest Pest Responses (NIPR) programme</i></p> <p>Timeframe: Years 1–6 (2022–28) – Lead agency: MPI – Relevant portfolio: Biosecurity – Primarily supports: Objective NE2 – Status: Current</p> <p>Nine harmful weeds are managed under the NIPR programme. These pests could cause serious harm to New Zealand's environment and economy if they are allowed to spread.</p>			
<p><i>Investment in plant health and environment capability</i></p> <p>Timeframe: Years 1–6 (2022–28) – Lead agency: MPI – Relevant portfolio: Biosecurity – Primarily supports: Objective NE2 – Status: Current</p> <p>Significant investment in MPI's plant health and environment operations (currently situated in Tāmaki, Auckland) will support growth and development in the arable, forestry and horticulture sectors by accelerating access to high-value plant varieties and cultivars to support commercialisation of new products. Faster access to genetic material can support innovation and deliver benefits such as higher yields and improved resilience to pests and diseases.</p>			
<p><i>Utilise the Animal Health Laboratory (AHL) and Plant Health Environment Laboratory (PHEL)</i></p> <p>Timeframe: Years 1–2 (2022–24) – Lead agency: MPI – Relevant portfolio: Biosecurity – Primarily supports: Objective NE2 – Status: Current</p> <p>AHL and PHEL are New Zealand's national reference laboratories that identify and validate suspected exotic and endemic pests and diseases affecting farm and aquatic animals, and wildfire (AHL), and plants and the environment (PHEL). Both laboratories are an essential component of New Zealand's wider biosecurity system and enable better understanding of new and emerging pests and diseases that are likely to establish in the future under changing climate conditions.</p>			

Supporting actions

Reform the Environmental Reporting and Monitoring System to allow better measurement of environmental change

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MfE – **Relevant portfolio:** Environment – **Primarily supports:** Objective NE1 – **Status:** Current

This work seeks to improve how we monitor, manage, access and report on environmental data. It will provide evidence-based insights and help identify gaps in our knowledge on climate impacts.

Deliver Jobs for Nature to restore indigenous ecosystems

Timeframe: Years 1–6 (2022–28 – some projects ongoing) – **Lead agencies:** MfE, DOC, MPI – **Relevant portfolios:** Environment; Conservation – **Primarily supports:** Objective NE1 – **Status:** Current

This action supports more than 200 projects to restore ecosystems, control pests and mobilise community action across the country. Biodiversity can be strengthened through restoring ecosystems and reducing pests.

Implement the National Policy Statement on Freshwater Management 2020

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MfE – **Relevant portfolio:** Environment – **Primarily supports:** Objective NE1 – **Status:** Current

Adaptation action for freshwater bodies will be achieved through local councils devising suitable plan provisions (eg, rules) to achieve a range of outcomes, and will need to ensure the ability to use resources (eg, land use, discharges, etc) is matched to the assimilative capacity of fresh water. Farmers will adapt land use practices in response to these, and as the impacts of climate change become apparent. These actions will ensure the healthy functioning of freshwater ecosystems and mitigate negative impacts from land use

Implement Revitalising the Gulf: Government action on the Sea Change Plan

Timeframe: Years 1–2 (2022–24) – **Lead agencies:** DOC, FNZ – **Relevant portfolios:** Conservation; Oceans and Fisheries – **Primarily supports:** Objective NE1 – **Status:** Current

This initiative includes the establishment of 18 new areas of marine protection and an area-based fisheries plan in the Hauraki Gulf Marine Park. Other elements include: protected species, active habitat restoration, marine biosecurity, aquaculture and Ahu Moana (localised marine management by local communities and mana whenua). Research, monitoring and reporting will help inform an adaptive management approach. Together these actions will enhance the health of the marine ecosystem (and therefore its resilience).

Implement the South-east Marine Protection Initiative

Timeframe: Years 1–2 (2022–24) – **Lead agency:** DOC – **Relevant portfolio:** Conservation/Oceans and Fisheries – **Primarily supports:** Objective NE1 – **Status:** Current

This initiative may result in 12 new areas of marine protection in the south-east waters of the South Island of New Zealand. It will improve the health of the marine ecosystem (and therefore its resilience) through managing impacts and will help inform future management through science and monitoring.

Implement the Sustainable Land Management Hill Country Erosion Programme

Timeframe: Year 1 (2022–23) – **Lead agency:** MPI – **Relevant portfolio:** Forestry – **Primarily supports:** Objective NE1 – **Status:** Current

The Sustainable Land Management Hill Country Erosion Programme will support regional planning for and treatment of erosion-prone land and, in turn, contribute to afforestation. Afforestation can reduce soil loss and other effects of the increasing scale and magnitude of storms. It also mitigates downstream damage to infrastructure.

Provide a forestry planning and advisory service

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MPI – **Relevant portfolio:** Forestry – **Primarily supports:** Objective NE1 – **Status:** Current

The forestry planning and advisory service will contribute to reducing climate risks by providing data-informed advice and planning tools. Advice will be provided on both harvest and non-harvest forestry, for example, consider where land is available for new forestry, where restoration, regeneration and reversion may be needed, and where unsuitable land may need to be retired from forestry including conversion from plantation to indigenous.

Future work programme proposals

Prioritise nature-based solutions and implement Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 (ANZBS)

Timeframe: Years 1–6 (2022–28) – **Lead agency:** DOC – **Relevant portfolio:** Conservation – **Primarily supports:** Objective NE1 – **Status:** Proposed

The ANZBS is a strategic document for the protection, restoration and sustainable use of biodiversity in New Zealand from 2020–50. The first iteration of the implementation plan will be launched in April 2022 and includes actions by agencies and local government delivering on the outcomes the Strategy, in particular climate change goals 13.2 and 13.3. These goals outline the potential for nature based solutions as a climate buffer.

The ANZBS aims to strengthen biodiversity, ecosystems and dynamic land and sea environments, and improve ecosystem health. The Strategy’s monitoring framework will monitor pest impacts on native forest. This will help reduce impacts on biodiversity. Implementing the ANZBS ensures actions and goals are put in place to protect native biodiversity from pressures such as invasive pests and measures the success of these endeavours.

Develop mātauranga Māori indicators of climate impacts on the natural environment

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MfE – **Relevant portfolio:** Environment – **Primarily supports:** Objective NE1 – **Status:** Proposed

Mātauranga Māori indicators will enable monitoring and evaluation of climate impacts on biodiversity, mahinga kai, flora, fauna and human health. This will create data baselines that centralise indigenous knowledge and values and can be used in environmental assessments.

Establish an integrated work programme to deliver climate, biodiversity and wider environmental outcomes

Timeframe: Years 1–4 (2022–26) – **Lead agencies:** DOC, MfE – **Relevant portfolios:** Conservation; Environment – **Primarily supports:** Objective NE3 – **Status:** Proposed

This initiative will address key barriers to regenerating and protecting native ecosystems, such as the cost of investing in native ecosystems and lack of New Zealand-specific evidence on non-forest carbon sequestration. It will look at creating better incentives for restoring existing native forests within key regulatory settings, such as the NZ ETS, and at how private and public money intended for offsetting hard to-abate emissions could support both climate and biodiversity outcomes. The programme will focus on the following areas.

- **Supporting restoration and protection of indigenous forests.** The forestry section sets out a series of actions, including reducing the costs of native plants and establishing a long-term work programme, to support native afforestation and restoration.
 - **Investing in the science of nature-friendly sequestration.** The Government supports and has commissioned research into the carbon storage and sequestration potential of non-forest ecosystems, such as wetlands, peatlands and coastal ecosystems in New Zealand. This includes a research project to scope improving New Zealand-specific estimates of organic soil emissions. This work will also investigate the impacts of management interventions, such as pest control and ecosystem restoration, on carbon sequestration and storage.
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- **Supporting native afforestation and restoration through the Carbon Neutral Government Programme.** By 2025, emissions that Carbon Neutral Government Programme participants are unable to reduce must be offset. The work programme will investigate how Government investment in sequestration as part of the Carbon Neutral Government Programme can also realise biodiversity and wider environmental outcomes.
 - **Investigating incentives for public and private investment in biodiversity.** This work will look to address the barriers landowners face in accessing funding and information. It will also look at how investments in biodiversity can protect and enhance carbon stocks and support climate resilience, so that companies investing in offsets can do so in a way that benefits both climate and biodiversity.
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Actions across other outcome areas also build the resilience of the natural environment

In addition to protecting the natural environment, work to reduce pests and diseases through border control reduces risks to human health. It will support the Communities section action to [Develop the Health National Adaptation Plan](#).

The Water Availability and Security programme also relates to actions in the Infrastructure section because it has important implications for infrastructure planning. The programme provides catchment-based, localised, collaborative processes to conceptualise, plan, develop and operate water infrastructure for multiple uses.

Actions in the Economy and financial system section will improve the health of the marine environment. Catch limits in fisheries system reform will enable stocks to replenish. The Aotearoa Circle Climate Change Adaptation Strategy for the Seafood Sector has a goal to enhance the resilience of the marine environment.

Natural environment questions

14. Do you agree with the actions set out in this chapter?

Yes

15. What else should guide central government's actions to address risks to the natural environment from a changing climate?

Begin to mandate environmentally friendly options in all areas (cleaning products, automotive products like oil and coolant) – it should not be the responsibility of our ratepayers, producers, and consumers to have to do the research and make those critical decisions constantly in their day-to-day lives. Product stewardship needs to be legislated, as the producers of toxic products that we import need to be responsible for the dumped waste in our forests.

Our water supply impacts our district's rivers and the water needed for our biodiversity and forests. If we can look at researching and legislating green alternatives that don't rely on water use (e.g. solar power), this would decrease the impacts on our natural environments.

Legislation of electricity industry needs to change, to facilitate consumer contributions to our power supply.

16. Are there other actions central government should consider to:

- a. support you, your community, iwi and hapū, business and/or organisation to build the natural environment's climate resilience?

Yes

See above

- b. strengthen biosecurity in the face of climate change?

Not known at this stage.

- c. identify and support New Zealand's most vulnerable ecosystems and species in a changing climate?

Possibly, but more research required.

17. What do you identify as the most important actions that will come from outside of central government (eg, local government, the private sector or other asset owners, iwi, hapū and/or other Māori groupings such as: business, forestry, fisheries, tourism, urban Māori, the private sector) to build the natural environment's resilience to the impacts of climate change?

The main groups providing most impact will be Māori, forestry, and the agriculture sector, in their actions to preserve natural spaces, plant the right tree in the right place and ensure that land remains productive and cared for.

Resetting the measure of wellness – delinking it from GDP.

18. Are there additional actions that would advance the role of Māori as kaitiaki in a changing climate?

A significant action (and one that has been sought for many years) would be to acknowledge the importance and providing the ability for Māori to have greater autonomy over their lands and its environment.

Homes, buildings and places

In this section:

- [Why we need to take action](#)
- [What we want to achieve](#)
- [How we will get there](#)
- [Actions across other outcome areas also contribute to resilient homes, buildings](#)

Why we need to take action

Homes, buildings and places⁷ are the foundation of communities in Aotearoa New Zealand. They include the physical environment around us, the people in that environment and the interaction between the two.

The form, design and characteristics of our homes, buildings and places play a vital role in our health, wellbeing and quality of life.

Most of our existing homes and buildings have been located and built without the without on-going changes to our climate in mind. As the climate changes, an increasing number of those homes and buildings are at risk of becoming less liveable or being damaged or destroyed.

A warmer and wetter climate may affect the durability of building materials and the life span of our homes and buildings. This could include an increased risk of damage due to coastal erosion or the risk of subsidence during intense rainfall and storm surges along the coastline.

Damage to existing housing stock from climate change could have knock-on effects for the country's housing supply. In particular, it could further reduce the supply and affordability of housing, weaken social cohesion and prevent communities from growing. It could also reduce access to good-quality housing for tenants, individuals and whānau experiencing or at risk of homelessness.

Scale of potential impacts

About 675,000 (or one in seven) people across New Zealand live in areas that are prone to flooding, which amounts to nearly \$100 billion worth of residential buildings. A further 72,065 people live in areas that are projected to be subject to extreme sea-level rise. The number of people exposed to these hazards will increase as the climate changes.

⁷ In the context of this outcome area, 'places' refers to urban or rural areas, ranging from neighbourhoods to towns and regions. Adaptation must address both the physical elements of a place (eg, homes, buildings, infrastructure and spaces around them) and the social elements (eg, the identity of people and communities, cultural value).

Impacts on cultural heritage

Climate change presents risks to culture, cultural heritage, and traditional knowledge and ways of life. Many hāpori (communities) will face challenges in activities such as documenting and conserving their taonga and cultural infrastructure, and managing properties and facilities. This includes marae, whenua, urupā and wāhi tapu (culturally sacred sites of significance).

Stresses on Māori and iwi

Climate-related hazards can also impact homes and buildings on whenua Māori, and threaten the unique cultural and spiritual connection Māori have to whenua.

Whenua Māori that has either always been in Māori ownership or returned through the Waitangi Tribunal is often on coastal fringes and lowland areas that are exposed to flooding, erosion and sedimentation.

Many significant cultural sites, such as marae, urupā, ancient gardens and healing places, are also located along coastlines or near rivers prone to flooding.

Case study: What is an urban heat island?

The effects of heatwaves are felt more in urban areas than rural areas because they absorb, produce, and retain more heat. This is because vehicles and buildings generate heat, and the dark paved surfaces that typically cover urban areas absorb heat. These impermeable paved surfaces also allow fewer plants to grow, which reduces the cooling effects of shading and evaporation and worsens air pollution.

The resulting 'urban heat-island' effect can increase temperatures in cities by as much as 10 degrees Celsius higher than the surrounding areas. Heat absorbed throughout the day is then released in the evening, raising night-time temperatures and worsening the effects of heatwaves.

Why the heat-island effect is an issue for people

Being exposed to extreme heat for prolonged periods puts stress on the body and can make existing health conditions worse. Heatwaves have widespread negative impacts on health, wellbeing and levels of comfort in occupied spaces, especially for older people and those who may not be able to pay to cool their homes. Extreme heat caused by climate change is also likely to intensify Māori and Pasifika health inequities.

Current and future actions

Building design, materials and urban planning can mitigate the heat-island effect. Planting more trees and using nature-based solutions for infrastructure help to cool urban areas, making this a simple and effective solution that countries around the world are using. In addition to reducing urban heat, the approach has other benefits such as:

- contributing to reducing greenhouse gas emissions
- enhancing mauri of land and water
- enhancing biodiversity
- improving human health and wellbeing.

Over time, these strategies and other proposed actions in the national adaptation plan will contribute to reducing the urban heat-island effect and improving the wellbeing of New Zealanders.

An example of a current action to achieve this in New Zealand is Kāinga Ora's Urban Ngahere Programme. Kāinga Ora is undertaking a large-scale urban development programme in Māngere. With relatively low canopy coverage in Māngere (only 8 per cent), this is an opportunity to show how Kāinga Ora can partner with the community, mana whenua and Auckland Council to increase canopy coverage, reduce inequality and uplift the mauri of the Māngere whenua and people. In addition, Auckland Council's Urban Ngahere Strategy aims to increase canopy coverage across Auckland more generally to 30 per cent.

What we want to achieve

Homes, buildings and places are resilient to the changing climate, allowing people and communities to thrive.

Homes and buildings are climate resilient and meet social and cultural needs (**objective HBP1**). This means:

- reducing exposure to climate hazards and supporting businesses and communities to understand and respond to climate risks
- improving homes and buildings so they can withstand the expected range of temperatures, rainfall and wind and to improve energy and water efficiency
- conserving valued cultural heritage.

New and existing places are planned and managed to minimise risks to communities from climate change (**objective HBP2**). This means:

- improving resilience through effective planning, urban design and management
- avoiding development in places that may be more exposed to climate impacts, supporting existing places to adapt and relocating people and assets where risks are seen as too high to manage
- managing risks to places of environmental value.

Māori connections to whenua and places of cultural value are strengthened through partnerships (**objective HBP3**). This means:

- supporting initiatives that identify and respond to climate risks that are specific to iwi and Māori
- working in partnership with iwi/Māori to develop Māori-led adaptation solutions
- identifying and embedding Māori knowledge, identity and values in urban design and construction to manage climate-related hazards
- increasing the resilience of cultural heritage, to strengthen the ties between whānau, hapū and iwi and their whenua.

Threats to cultural heritage arising from climate change are understood and impacts minimised (**objective HBP4**). This means:

- understanding where cultural heritage sites are, their values, who they are important to and how climate change could affect them
- understanding how the loss of cultural heritage can affect social, cultural, spiritual and economic wellbeing, including for Māori; and the positive role of cultural heritage in adaptation and wellbeing

- improving disaster management for cultural heritage
- enabling communities to maintain and protect their taonga and assets
- protecting and conserving cultural heritage through appropriate regulation.

The actions that follow are designed to achieve these objectives and address the **risk to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise**. This risk was identified as a significant risk in the National Climate Change Risk Assessment (NCCRA).

Other risks addressed through these actions include risks to:

- Māori social, cultural, spiritual and economic wellbeing from loss and degradation of lands and waters, as well as cultural assets such as marae
- Māori and European cultural heritage sites due to projected ongoing sea-level rise, extreme weather events and increasing fire weather.

How we will get there

Critical actions

Build property resilience

Timeframe: Years 1–4 (2022–26) – **Lead agencies:** HUD, MBIE – **Relevant portfolio:** Housing; Building and Construction – **Primarily supports:** Objective HBP1 – **Status:** Current

This action includes three outputs that build off each other and support other actions in this section:

- **research** to understand the impacts of climate hazards on various housing typologies and the costs and benefits of adaptation strategies at the property level and to inform any future changes to building regulations and standards
- **property-level guidance** to inform homeowners and renters about climate impacts and their options to manage and respond to risks
- an **assessment framework** to help building owners, developers and new home builders to identify climate hazards relevant to their property and understand their building's adaptation requirements

Initial research stages have been scoped and funded and are underway. By August 2024, sufficient data will be available to inform the development of an assessment framework in years 3–4 (2024–26) and inform regulatory updates.

Establish an initiative for resilient public housing

Timeframe: Years 1–2 (2022–24) – **Lead agency:** Kāinga Ora – **Relevant portfolio:** Housing – **Primarily supports:** Objective HBP1 – **Status:** Current

A decision-making framework for public housing assets will be developed to determine the actions needed to adapt new and existing assets. This work will help reduce exposure of public housing tenants to climate-related hazards.

This action will increase the resilience of public housing by identifying where retrofitting is needed and ensuring new dwellings are built away from areas prone to climate hazards. It

will also promote effective planning and the design of resilient infrastructure as part of public housing activities.

Kāinga Ora has undertaken an assessment to determine risk exposure and is increasing understanding of the assumptions and limitations of the data that it has based the assessment on.

By August 2024, we will have understood our material climate risks, developed a conceptual decision-making framework, and determined how the framework should be applied to investment decision making.

Embed adaptation in funding models for housing and urban development, and Māori housing

Timeframe: Years 1–2 (2022–24) – **Lead agency:** HUD – **Relevant portfolio:** Housing – **Primarily supports:** objectives HBP1 and HBP2 – **Status:** Current

Existing funding programmes for urban development and housing, including Māori housing, will be updated to ensure they consider the costs of existing and future climate hazards. New funding programmes may be created if gaps are identified.

This action will help ensure that funding decisions to support urban growth consider climate-related hazards, for example by ensuring new infrastructure is built away from areas prone to sea-level rise or flooding.

This action will also result in reviewing funding settings for new development so that government-funded housing, including Māori housing, can cope with extreme events and the changing climate

By August 2024, the Ministry of Housing and Urban Development (HUD) will review the funding programmes it administers and amend them to appropriately consider climate-related risks.

Support kaitiaki communities to adapt and conserve taonga/cultural assets

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MCH – **Relevant portfolio:** Culture and Heritage – **Primarily supports:** objectives HBP3 and HBP4 – **Status:** Current

Working across government to ensure iwi/Māori and communities have access to information so that they can plan for and adapt their cultural assets. Support includes advice, wānanga, provision of expert assistance, information sharing and funding advice to assist kaitiaki to self-determine adaptation pathways.

This action will provide a coordinated cross-government approach, partnering with iwi and Māori to understand the threats to cultural heritage from climate change and to support initiatives to reduce the impact.

This action will also help achieve *objective HBP1: Homes and buildings are climate resilient and meet social and cultural needs* by adapting and conserving physical structure of cultural values. It also contributes to *objective HBP4: Threats to cultural heritage arising from climate change are understood and impacts minimised* through its focus on taonga of significant value to iwi and Māori.

Supporting actions

Work is underway to ensure the Government's interventions to increase housing supply, affordability and quality are taking climate change into account. For example, the **Government Policy Statement for Housing and Urban Development** signals the strategic direction for adaptation.

The Government has recently amended its objectives for the **Urban Growth Agenda** to sharpen the focus on climate impacts and responses. The **National Māori Housing Strategy, MAIHI Ka Ora**, also stresses the importance of maintaining a connection to whenua and includes sustainability as a pou (priority area).

Other work in progress is helping to initiate and support adaptation for the building and construction sector. For example, the **Building for Climate Change work programme** will support actions in the national adaptation plan to increase adaptation and resilience. It is also connected to the work on emissions reduction and seismic resilience.

Future work programme proposals

Ensure minimum regulatory requirements for buildings take into account future climate data

Timeframe: Years 3–6 (2024–28) – **Lead agency:** MBIE – **Relevant portfolio:** Building and Construction – **Primarily supports:** HBP1 – **Status:** Proposed

Update Building Code performance requirements to respond to forward-looking climate hazards, identify and add hazards not currently in the Building Code, and produce guidance and tools to help people meet new performance requirements. This action will also explore regulatory changes that could support the adaptation of existing buildings. Work on performance requirements will also take into consideration costs and distributional impacts.

This action will improve the quality of buildings and make them resilient to future climate impacts.

Manage potential impacts of adaptation related to regulatory change

Timeframe: Years 5–6 (2026–28) – **Lead agency:** MBIE – **Relevant portfolio:** Building and Construction – **Primarily supports:** Objective HBP1 – **Status:** Proposed

We will monitor the effects of actions to Build property resilience and update minimum regulatory requirements for buildings to identify who these regulatory changes may adversely impact. Future actions to manage impacts could include producing advice or guidance supporting local initiatives and offering incentives. Actions would need to align with activities to reduce the distributional impacts of emissions reduction. This action will address negative impacts of adaptation-related regulatory changes for buildings and manage barriers to the public adapting.

Design methodology for risk assessments of public buildings

Timeframe: Years 3–4 (2024–26) – **Lead agency:** MBIE – **Relevant portfolio:** Building and Construction – **Primarily supports:** Objective HBP1 – **Status:** Proposed

Develop a methodology for risk assessment based on the property resilience research that will take into account matters such as cultural and heritage values and seismic hazard risks, to support decisions.

Work with community housing providers to enable effective climate hazard response

Timeframe: Years 2–4 (2023–26) – **Lead agency:** HUD – **Relevant portfolio:** Public Housing – **Primarily supports:** Objective HBP1 – **Status:** Proposed

This action will provide better data and information on the exposure of community housing providers to climate risks. An action programme will increase the resilience of community housing by supporting strategies for emergency management and long-term adaptation, which in turn will reduce exposure of community housing tenants to climate-related risks. This work will also focus on working with Māori and Pacific providers and will help increasing resilience in ways that are culturally appropriate and respond to the needs of Māori and Pacific recipients.

Update housing and urban settings

Timeframe: Years 5–6 (2026–28) – **Lead agency:** HUD – **Relevant portfolio:** Housing – **Primarily supports:** Objective HBP2 – **Status:** Proposed

Current strategies, programmes and regulations will be reviewed to ensure housing and urban environments are fit for the changing climate. For example, this could lead to updated requirements for homeowners and landlords, or requirements relevant to public and community housing. This action will help ensure the built environment is designed and planned to cope with extreme events and the changing climate. It also helps ensure that rules relating to the quality of private and public housing and tenancies consider climate change and continue to be fit for purpose.

Integrate nature-based solutions into the urban environment

Timeframe: Years 1–2 (2022–24) – **Lead agency:** HUD – **Relevant portfolio:** Housing – **Primarily supports:** Objective HBP2 – **Status:** Proposed

This work will build on indigenous knowledge and new research to produce new data and insights on using nature-based solutions like vegetation (eg, street trees or green roofs) and water elements (eg, open canals or waterways) in the urban environment. It will then be possible to use the findings to identify strategies for integrating natural features into the urban environment to increase resilience, improve biodiversity outcomes and provide services to people and communities.

This action will help reduce the impact of extreme events, such as flooding and heatwaves, on the built environment. It will also help to ground urban adaptation solutions in mātauranga Māori and recognise that its intended outcomes already draw on fundamental Māori values.

Partner with iwi to facilitate through Iwi Management Plans

Timeframe: Years 3–4 (2024–26) – **Lead agency:** HUD – **Relevant portfolio:** Housing – **Primarily supports:** Objective HBP3 – **Status:** Proposed

This work will be progressed in partnership with iwi to assess how well climate-related hazards are considered in Iwi Management Plans. This action will support iwi-led solutions and the use of mātauranga Māori in responses to climate hazards. It will also promote iwi-led planning and supporting adaptation of places managed by iwi.

Partner with Māori land owners to increase the resilience of Māori-owned land, homes and cultural sites

Timeframe: Years 3–4 (2024–26) – **Lead agency:** HUD – **Relevant portfolio:** Māori Housing – **Primarily supports:** Objective HBP3 – **Status:** Proposed

This work will be progressed in partnership with Māori land owners to produce resources and tools to build a better understanding of climate-related risks and increase the resilience of housing on Māori land. It will promote mātauranga Māori and Māori urban design principles, and increase the resilience of Māori-owned land, homes and cultural sites.

Research how cultural heritage contributes to community wellbeing and climate change adaptation

Timeframe: Years 1–4 (2022–26) – **Lead agency:** MCH – **Relevant portfolio:** Culture and Heritage – **Primarily supports:** Objective HBP4 – **Status:** Proposed

This research will look at the value of cultural heritage in building and sustaining communities and how this is linked to community climate resilience and wellbeing.

Produce guidance for disaster risk management for cultural heritage

Timeframe: Years 2–5 (2023–27) – **Lead agency:** MCH – **Relevant portfolio:** Culture and Heritage – **Primarily supports:** Objective HBP4 – **Status:** Proposed

Improve disaster-risk management for cultural heritage by producing guidance for reducing risks before, during and after disasters.

Develop a framework for assessing exposure and vulnerability of cultural assets/taonga to climate change

Timeframe: Years 1–3 (2022–25) – **Lead agency:** MCH – **Relevant portfolio:** Culture and Heritage – **Primarily supports:** Objective HBP4 – **Status:** Proposed

Working with partners (including iwi), the Ministry for Culture and Heritage (MCH) will identify national and local data on taonga/cultural assets. It will identify gaps, data needs and governance and develop a framework to spatially identify valued cultural heritage and the exposure and vulnerability of that cultural heritage to climate change.

Actions across other outcome areas also contribute to resilient homes, buildings and places

The following actions will closely align with this section and support the resilience of homes, buildings and places.

System-wide reforms will encourage a long-term and proactive view to account for climate change. For example, **resource management reform** will support effective spatial planning by promoting development in areas away from climate-related hazards. It will also set out a framework to manage retreat and relocate communities, homes and buildings where risks are seen as unacceptable.

Actions to strengthen ecosystems and to promote the use of indigenous knowledge in the section on natural environment will complement actions to increase the resilience of homes, buildings and places that are alongside the natural environment or include natural sites.

Infrastructure plays a key role in supporting the resilience of homes, buildings and places by connecting communities and places and allowing for goods and services to travel. It also supports new development and housing and helps communities to thrive.

For example, the action to **develop climate change impact assessment guidance for infrastructure** will support adaptation of transport and energy networks. That in turn will complement the **design methodology for risk assessments of public buildings** that includes a focus on ‘social’ infrastructure, such as schools, hospitals and other public assets.

A number of actions in the section on communities will increase social cohesion and support communities to identify climate-related hazards that are relevant to them, including those relevant for homes, buildings and places.

For example, **improving natural hazard information on Land Information Memoranda (LIM)** will help raise awareness of climate-related hazards at the property level.

The actions relating to insurance availability and affordability in the section on the economy and financial system will help to keep insurance for homes and buildings available and affordable. This will support recovery after extreme weather events.

Homes, buildings and places questions

19. Do you agree with the outcome and objectives in this chapter?

Yes

20. What else should guide central government's actions to increase the resilience of our homes, buildings and places?

The principle that if you provide information about hazards to consumers, you also should provide relevant, useful, interpretable guidance on how to address those hazards (at the same time).

21. Do you agree with the actions set out in this chapter?

Yes

22. Are there other actions central government should consider to:

a. better promote the use of mātauranga Māori and Māori urban design principles to support adaptation of homes, buildings and places?

Not at this time - We find the actions described by this draft plan encouraging as they cover a broad range of aspects and we believe their implementation will provide for a better understanding of the Māori worldview from a Māori context, further enhancing decision making.

b. ensure these actions support adaptation measures targeted to different places and respond to local social, cultural, economic and environmental characteristics?

Not that we can identify at this time.

c. understand and minimise the impacts to cultural heritage arising from climate change?

Not that we can identify at this time.

The following questions are about existing buildings. These can include housing, communal residential (hotels, retirement village), communal non-residential (church, public swimming pools), commercial (library, offices, restaurant), industrial (factory, warehouse).

23. Do you think that there is a role for government in supporting actions to make existing homes and/or buildings more resilient to future climate hazards?

Yes

If yes, what type of support would be effective?

If the building provides a unique purpose that is unable to be easily replicated, relocation and protection may be appropriate. It would have to be on a case-by-case basis, as this support could not be provided to large numbers of buildings, due to the cost vs benefit.

24. From the proposed actions for buildings, what groups are likely to be most impacted and what actions or policies could help reduce these impacts?

Taxpayers, particularly those on low fixed incomes. We have a disproportionate number of low-income ratepayers, and they will be adversely affected by future costs.

25. What are some of the current barriers you have observed or experienced to increasing buildings' resilience to climate change impacts?

There are widely accepted, viable technology options utilised overseas (i.e., instant booms/stop banks used in America) that have not been adopted in New Zealand. These options could benefit communities and their ability to respond to climate events. Technology affordability is an issue – we consider research into international innovations to be essential, yet the lack of it presents a barrier to New Zealanders.

Infrastructure

In this section:

- [Why we need to take action](#)
- [What we want to achieve](#)
- [How we will get there](#)
- [Actions across other outcome areas also contribute to resilient infrastructure](#)

Why we need to take action

Infrastructure underpins our society by providing the services we depend on to live, work, learn and play. Infrastructure includes:

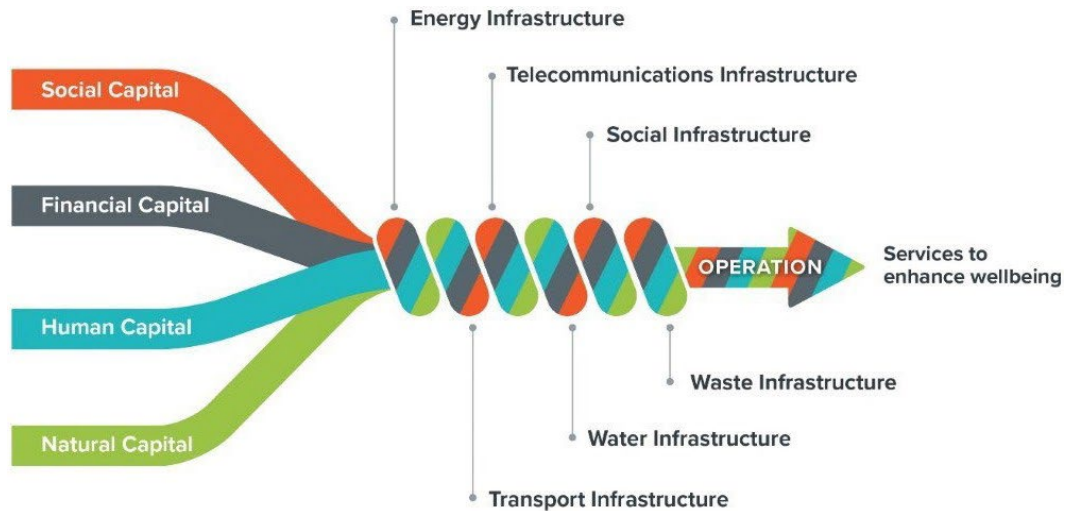
- **energy** – energy generation and distribution networks, including liquid and gaseous fuels, as well as electricity
- **telecommunications** – communication networks, including voice and data transfer and storage
- **transport** – land transport networks, as well as ports and airports
- **water** – wastewater, stormwater, drinking water and irrigation networks, including sources of water (eg, dams, rivers, reservoirs and groundwater), and waterbodies into which stormwater and wastewater are discharged
- **waste** – resource recovery and landfill assets used to manage our waste
- **social** – education and training facilities; health and aged care facilities; community assets such as libraries, stadiums and community centres; the Defence Estate; justice assets, including courts, prisons and remand centres; and social housing (see figure 6).

For Māori, the notion of cultural infrastructure, as represented in the social and cultural systems such as iwi, hapū and whānau, and the associated physical and spiritual structures such as marae and urupā are also important.

In the same way that the physical infrastructure of roads, telecommunication systems and energy systems need to be resilient, so does the cultural infrastructure for Māori.

In the context of the national adaptation plan, the section on homes, buildings and places deals with many of the buildings this plan defines as ‘social infrastructure’. The actions in both that section and this one should be considered together to gain a full picture of adaptation actions for the built environment.

Figure 6: Definition of infrastructure



Source: Te Waihanga, 2020

What we want to achieve

Our infrastructure is resilient to a changing climate, so that it protects or enhances the wellbeing of all New Zealanders.

Reduce the vulnerability of assets exposed to climate change (**objective I1**). This means:

- understanding where infrastructure assets and the services they provide are exposed and vulnerable to the impacts of climate
- prioritising asset risk management to ensure services can continue if disruption occurs.

Ensure all new infrastructure is fit for a changing climate (**objective I2**). This means:

- considering long-term climate impacts when we make decisions on infrastructure design and investment so the right infrastructure is in the right places
- understanding future adaptation options and financing them as part of the investment in new infrastructure to build adaptive capacity.

Use renewal programmes to improve adaptive capacity (**objective I3**). This means

- considering long-term climate impacts when making decisions to maintain, upgrade, repair or replace existing infrastructure.

Climate change will affect all of our infrastructure, but some assets require more urgent attention than others. The actions that follow are designed to achieve these objectives and address the **built environment** risks in the National Climate Change Risk Assessment (NCCRA). In particular, they address:

- the risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise.

How we will get there

Working together

Infrastructure asset owners include central and local government and the private sector, onshore and offshore (see table 4). This means that there is a range of drivers underpinning our collective response to climate change.

Important drivers for the private sector are board fiduciary duty, NZX rules and investor sentiment on corporate responsibility and non-financial risk management. For Crown entities, Government priorities and policy, as well as board fiduciary duty, direct their responses. Local government decisions reflect long-term plans and the ability and willingness of ratepayers to pay.

Table 4: Horizontal infrastructure governance

Infrastructure type	Governance	Lifeline utility ¹
Road transport	Crown entity, and central and local government	Yes
Rail transport	Crown entity, and central and local government	Yes
Ports	Local government	Yes
Airports	Private sector, and central and local government	Yes
Energy ²	Private sector	Yes
Water	Local government	Yes
Telecommunications and digital	Public and private sector	Yes ³
Waste and resource recovery	Private sector and local government	No

Note:

1. The Civil Defence Emergency Management Act 2002 identifies the entities and sectors that represent a lifeline utility, which includes many of the infrastructure classes that this section seeks to influence. Under the Act, every lifeline utility must be able to “function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency”.
2. Including generation and distribution.
3. Radio New Zealand and Television New Zealand, and telecommunications network providers.

For adaptation to progress, all asset owners must begin the process of understanding and actively managing climate risk. Because asset owners differ in their drivers as noted above, not all actions in this section will influence all assets in the same way or within the same timeframes.

Actions have, however, been developed with the intention of supporting action at the system level, across all asset classes.

Critical actions

Develop a methodology for assessing impacts on physical assets and the services they provide

Timeframe: Years 2–3 (2023–25) – **Lead agency:** Te Waihanganga – **Relevant portfolio:** Infrastructure – **Primarily supports:** Objective I1 – **Status:** Current

We will scope and deliver a leading-practice methodology for assessing impacts on physical assets and the services they provide. This will assist asset owners to understand and manage the risks to existing and new assets, aligned with requirements under the CDEM Act. It will also

be designed to leverage, and integrate into, existing enterprise risk-management systems, so climate risks become increasingly assessed alongside other natural and systemic risks.

The methodology may include approaches to understanding how risk may change over the medium to long term, along with approaches to determining criticality, which will help in prioritising resilience actions. It may also include processes for determining planned emergency levels of service, which at the asset level is one of the foundations of resilience planning.

Specific opportunities to ensure that Iwi/Māori interests are not disproportionately harmed and/or inequities exacerbated will also be explored. Alongside this, it will consider the needs of other groups who may be disproportionately impacted by climate change, or who are least able to adapt, including people of lower socio-economic status, disabled people, women, older people, youth and migrant communities.

Opportunities to integrate mātauranga Māori and nature-based solutions will also be explored.

In 2023 the methodology will be complete.

Scope a resilience standard or code for infrastructure

Timeframe: Years 1–2 (2022–24) – **Lead agency:** Te Waihanga – **Relevant portfolio:** Infrastructure – **Primarily supports:** Objective I3 – **Status:** Current

We will scope the impact, including costs, benefits and regulatory impact, of introducing a voluntary standard or code for resilient infrastructure.

This action will focus on:

- how a standard or code would encourage leading-practice risk reduction and resilience planning in existing and new assets
- how to integrate resilience planning into the asset-management cycle to maximise uptake and impact.

If a standard or code proceeds, this would draw on international leading practice; the methodology for assessing impacts on physical assets and the services they provide being developed as part of the actions for infrastructure in this section (see objective I1); and the general data, tools and guidance that will be developed as part of the system-wide actions.

By 2024, advice on the best way forward will be complete.

Integrate adaptation into Treasury decisions on infrastructure

Timeframe: Years 1–5 (2022–27) – **Lead agency:** – Treasury – **Relevant portfolio:** Infrastructure – **Primarily supports:** Objective I2 – **Status:** Current

The Treasury publishes a range of guidance for central government departments and other entities to guide investment management and state sector performance. We will integrate consideration of climate risks and future adaptation requirements into this guidance to help ensure that in taking decisions for new assets and across major renewal or upgrade programmes to plan to:

- include climate change risks in the strategic case and early assessment of the options
- ensure that actions generally acknowledged to build adaptive capacity are included in optioneering (eg, nature-based solutions)
- incorporate the full cost of adaptation over the life of an asset into decision-making

- set up durable investment management systems and processes to respond to, and fund and finance, climate action, with positive climate and resilience outcomes.

The changes to process, and the development of tools, will leverage the system-wide and infrastructure-specific guidance, tools, and methodologies being developed as part of the national adaptation plan.

By 2024, advice on the best way forward, and any associated budget bid or Cabinet decisions, will be complete.

Develop and implement the Waka Kotahi Climate Change Adaptation Action Plan

Timeframe: Years 1–6 (2022–28) – **Lead agency:** Waka Kotahi – **Relevant portfolio:** Transport – **Primarily supports:** Objective I3 – **Status:** Current

Waka Kotahi will publish and begin implementing an Adaptation Action Plan in 2022. The plan will outline how Waka Kotahi will take action to adapt to climate change through the design, delivery, operation and use of the land transport system.

It will address exposed existing assets and new investment in infrastructure, as well as considering adaptation in renewal programmes.

Waka Kotahi will consider multiple risks to the land transport system from climate-related hazards – including sea-level rise, flooding and landslides. Waka Kotahi will lead, collaborate on and support land transport system adaptation, enabling climate-resilient transport networks and journeys, where people live, work and play.

By 2024, an adaptation plan will be published and a reporting framework on the implementation of the adaptation plan developed.

Supporting actions

Manage dry-year risk through the New Zealand Battery Project

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MBIE – **Relevant portfolio:** Energy – **Primarily supports:** Objective I1 – **Status:** Current

The Government is undertaking the New Zealand Battery Project to assess the feasibility of options for managing dry-year risk in a highly renewable electricity system. The current focus is on the feasibility of pumped hydro-electricity at Lake Onslow. The feasibility study will be completed by the end of 2022. The overall aim of the project is to increase the resilience of New Zealand’s electricity system to the dry-year problem when the country’s hydro lakes have low inflows for extended periods.

Encourage and support the evaluation of climate-related risks to landfills and contaminated sites

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MfE – **Relevant portfolio:** Environment – **Primarily supports:** Objective I1 – **Status:** Current

Coastal inundation and flooding could be a significant risk to existing and closed landfills, as well as to contaminated sites, across the country. At least 110 closed landfills are vulnerable to sea-level rise. The Ministry for the Environment (MfE) has developed a tool for councils to use to evaluate climate-related risks for landfills and contaminated sites, which may make it easier for local government to evaluate the risks from these sites and support planning to address risks.

Explore funding options to support the investigation and remediation of contaminated sites and landfills vulnerable to the effects of climate change

Timeframe: Years 4–6 (2025–28) – **Lead agency:** MfE – **Relevant portfolio:** Environment – **Primarily supports:** Objective I1 – **Status:** Current

The liability of legacy landfill remediation generally sits with territorial authorities, who have variable ability to pay, particularly in smaller local government areas. Considering this, the Government has agreed to consider how best to support the funding of remediation.⁸ Access to funding will help to turn risk assessment into risk reduction and ensure that remediation can occur before inundation risks become a reality. The scope of the existing Contaminated Sites Remediation Fund does not at present extend to climate-related impacts.

Integrate adaptation into Waka Kotahi decision making

Timeframe: Year 1 (2022/23) – **Lead agencies:** Waka Kotahi, MOT – **Relevant portfolio:** Transport – **Primarily supports:** Objective I3 – **Status:** Current

Waka Kotahi will incorporate adaptation when it applies an intervention hierarchy to existing and new investments in the land transport system. The hierarchy will be used to manage the vulnerability of assets to climate change, and will be applied to existing assets, new infrastructure, and in renewal programmes. The intervention hierarchy promotes integrated planning (aligning development with resilient infrastructure/locations), demand management, and best use of the existing system ahead of new infrastructure.

Progress the rail network investment programme

Timeframe: Years 1–6 (2022–28) – **Lead agencies:** Waka Kotahi, MOT – **Relevant portfolio:** Transport – **Primarily supports:** Objective I2 – **Status:** Current

This action is a long-term commitment to invest in rail, with the aim of restoring it to a resilient and reliable state. Restoration of the network will reduce the vulnerability of the network to climate-related hazards and provide a platform for climate-resilient future investments. Multi-modality supports the resilience of the supply chain.

⁸ New Zealand Cabinet. 2019. *Landfills Vulnerable to the Effects of Climate Change*. Cabinet Committee on Economic Development Minute of Decision DEV-19-MIN-0305. Wellington: Cabinet Office, Department of Prime Minister and Cabinet.

Invest in public transport and active transport

Timeframe: Years 1–6 (2022–28) – **Lead agencies:** MOT – **Relevant portfolio:** Transport – **Primarily supports:** Objective I3 – **Status:** Current

Investment in multi-modal infrastructure can increase the resilience of the transport system and help to manage vulnerability of existing assets. An increase in the use of public transport and active modes will help reduce reliance on private vehicles. It will increase system redundancy, improve equity and support sustainable growth. Safe and attractive alternatives to driving create an overall more climate-resilient transport system, support sustainable growth and reduce emissions.

Increase uptake of tools to invest in infrastructure in urban areas

Timeframe: Years 1–5 (2022–27) – **Lead agencies:** HUD, Treasury, DIA – **Relevant portfolio:** Infrastructure – **Primarily supports:** Objective I2 – **Status:** Current

The Government, through the Infrastructure Funding, Financing and Delivery pillar of its Urban Growth Agenda, is identifying opportunities for addressing systemic barriers to infrastructure provision. This includes exploring options for supporting a more stable, certain and responsive infrastructure funding system, and addressing the institutional barriers and incentives that may be limiting the uptake of existing infrastructure funding and financing tools. One of the three objectives of the Urban Growth Agenda (alongside affordable housing and emissions reductions) is liveable and resilient cities, which involves making urban areas more accessible and inclusive, and increasing resilience to natural hazards and climate impacts.

Support the integration of climate adaptation and mitigation in new and revised standards

Timeframe: Years 2–6 (2023–28) – **Lead agency:** Standards NZ – **Relevant portfolio:** Infrastructure – **Primarily supports:** Objective I3 – **Status:** Current

At the beginning of each relevant project, Standards NZ may bring climate action (adaptation and mitigation) to the attention of the committee members of a standard commissioned through Standards NZ. This may help improve climate resilience in existing and new assets by guiding industry practice in asset design and operation.

Future work programme proposals

Develop the National Energy Strategy

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MBIE – **Relevant portfolio:** Energy – **Primarily supports:** Objective I2 – **Status:** Proposed

The Government has committed to developing an energy strategy, fully collaborating and engaging with Māori and working with energy system stakeholders. The National Energy Strategy will signal pathways to achieve the 2050 target for emissions reduction and set out a vision for a net zero economy where energy is accessible and affordable, secure and reliable, and supports the wellbeing of all New Zealanders. The Strategy could also consider broader objectives such as security and reliability of energy supply, alongside decarbonisation and affordability. It may include a focus on preparing the electricity system to meet future needs, which will likely require adaptation actions.

Actions across other outcome areas also contribute to resilient infrastructure

Many government work programmes will contribute to building the resilience and adaptive capacity of new and existing infrastructure assets. The contribution of the following will be particularly significant.

- **Resource management reform:** Te Waihangā will work with the Ministry for the Environment to include climate action measures for infrastructure in relevant parts of the National Planning Framework. This will influence the development of new assets, as well as maintenance, upgrades and major works on existing assets, in the new resource management system.
- **Modernise the emergency management system:** A multi-year work programme is underway for New Zealand's emergency management system. Obligations under the current Act include risk reduction activities to support continuity of services during and after disruptions. Part of the legislative work under the programme may be to strengthen the duties and obligations of lifeline utilities before, during and after emergencies. It may also influence where, when and how asset owners invest in new assets.
- **Support high-quality implementation of the climate related disclosures programme and explore expansion:** The Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 requires approximately 200 of Aotearoa New Zealand's largest financial market participants to analyse and publicly disclose their climate-related risks and opportunities each year.

This may require or encourage infrastructure asset owners to understand climate risks and develop a management response, including considering climate risks when deciding where, when and how investment in new assets takes place.

- **Addressing risks to potable water supplies – reform of the water sector:** Over the next 30–40 years, an estimated \$120 billion to \$185 billion upgrade of water assets will be required to meet drinking water and environmental standards, and provide for future population growth. The Government is undertaking an ambitious reform of the three waters system. The aim is to significantly improve the safety, quality, resilience, accessibility and performance of the three waters services, in a way that is efficient and affordable for New Zealanders. One objective is to “deliver water services in a sustainable and resilient manner that seeks to mitigate the effects of climate change and natural hazards”.⁹

The work programme on Water Availability and Security (see the section on the natural environment) also has important implications for infrastructure planning and development in the context of a changing climate. Taking a strategic approach to supply and demand at the catchment level will allow a better understanding of future water supply and distribution needs, as well as expose any vulnerabilities. This will help water service entities to decide where, when and how they may deliver new assets, as well as reinforce when demand management will become critical.

⁹ Water Services Entities Bill – Draft for Consultation, s 10.

- **Addressing risks to linear transport systems:** The national Freight and Supply Chain strategy will present a long-term and system-wide view of the freight system. It is considering climate adaptation through its resilience objective, to ensure New Zealand’s freight and supply chain system is resilient, reliable and prepared for potential disruption. This will inform the Government, councils and private sector players when they are making decisions about freight infrastructure investment.

Case study: RiverLink – improved transport network, better flood protection and new community spaces

The RiverLink project will transform Lower Hutt through transport improvements, upgraded flood protection and urban development. The result will be a more resilient, more connected and more vibrant city.

The project is a partnership between Waka Kotahi NZ Transport Agency, Greater Wellington Regional Council, Hutt City Council and mana whenua Ngāti Toa Rangatira and Taranaki Whānui ki Te Upoko o Te Ika.

Project activity

Transport improvements will include constructing:

- a new interchange at Melling (with a local road going over State Highway 2) and a river bridge, connecting to the Lower Hutt central business district
- a new pedestrian and cycle bridge linking directly to the relocated Melling Station
- new intersections and road realignments that integrate with the local network
- enhanced pedestrian and cycle routes – plus cycle storage, bus hub and park-ride facilities – giving commuters and residents more travel options.

Flood protection upgrades will include:

- lowering and widening Te Awa Kairangi Hutt River, giving it more room to flow naturally and enabling a higher volume of water to pass down the river during floods, as well as enabling more fish habitats to be established
- raising the height of the stopbanks and upgrading them to strengthen flood defences.

Urban development will include creating new spaces by the river for people to live, work and play. Some of these spaces will be:

- a waterfront promenade to support the development of new cafés, restaurants and apartments in the area
- pedestrian and cycling paths
- recreational and grass areas.

As well as increasing resilience and connectivity, these works are expected to lead to social and economic growth and turn Lower Hutt into a true river-facing city.

Infrastructure questions

26. Do you agree with the outcome and objectives in this chapter?

Yes

27. What else should guide central government's actions to prepare infrastructure for a changing climate?

Consideration of how to integrate different sectors in the use of the infrastructure i.e., rail and road – Waka Kotahi could be involved in conversations about how to use rail to prevent supply chain disruptions. Our district has the main trunk line, and yet we can't utilise it when roads are damaged by climate events as the capacity hasn't been planned for.

28. Do you agree with the actions set out in this chapter?

Yes

29. The national adaptation plan has identified several actions to support adaptation in all infrastructure types and all regions of Aotearoa.

a. Do you see potential for further aligning actions across local government, central government and private sector asset owners?

Yes

Please explain your answer.

As per Q27

b. Do you see any further opportunities to include local mana whenua perspectives and mātauranga Māori in infrastructure adaptation decision-making?

Ruapehu District Council supports further understanding of the cultural implications of infrastructure adaptation decision-making, given that Māori have a strong connection to the environment (i.e. land, water, etc).

c. Do you see any further opportunities to include local community perspectives in infrastructure adaptation decision-making?

Yes

Please explain your answer.

Seek perspectives from local government of how best to use local infrastructure to respond to climate events.

- d. Do you see any further opportunities to ensure that groups who may be disproportionately impacted by climate change, or who are less able to adapt (such as those on low incomes, beneficiaries, disabled people, women, older people, youth, migrant communities) have continued and improved access to infrastructure services as we adapt?

Yes

Please explain your answer.

These groups need assistance to make choices and adapt early – they do not have the same agility to respond. Education is essential – and information needs to be tailored to the recipient in a user-friendly medium. It also needs to be part of the school curriculum – our rangitahi will be facing the most severe impacts in their lifetimes and will be essential to helping their parents adapt – especially if their parents fall into one of the groups listed above.

- e. Do you think we have prioritized the right tools and guidance to help infrastructure asset owners understand and manage climate risk?

Yes

30. Are there additional infrastructure actions that would help to strengthen Māori climate resilience?

None identified at this time – we understand that as awareness and integration of Te Ao Māori becomes more pronounced, more opportunities and actions will become visible.

31. Are there any other tools or data that would help infrastructure asset owners make better decisions?

No, as long as the data is easily accessible

Communities

In this section:

- [Why we need to take action](#)
- [What we want to achieve](#)
- [How we will get there](#)
- [Actions across other outcome areas also contribute to resilient communities](#)

Why we need to take action

Climate change is already affecting how we live. The impacts we face will increase, so having a planned response is essential. We will meet challenges. Individuals and communities may need to move away from high-risk areas.

We may need to think differently about property and land rights if areas become too risky to live in. We may also need to welcome people from smaller Pacific nations that have been displaced by the impacts of climate change.

Some individuals and communities are more exposed to climate impacts because of where they live. For example, many Māori communities are in rural areas along coastlines and near major rivers. Rural communities, including farmland, will be disproportionately affected.

The Government acknowledges that some of the land returned to iwi/Māori through Waitangi Tribunal claims is highly risk-exposed or isolated. The Crown has a duty under Te Tiriti to support Māori and advance their rangatiratanga.

Other vulnerable community members include those experiencing poverty, Pacific peoples, refugees, migrants, women, elderly and disabled people. We acknowledge that these groups will also require support to adapt.

Communities vary greatly in their connections and ability to adapt. In some areas, communities have strong connections, are able to withstand many external challenges and able to adapt. Others are more disconnected and under-resourced.

The effects of climate change will make us more reliant on one another to meet our practical needs, as well as for our emotional and spiritual wellbeing.

For this outcome area

Community is defined geographically as a group of people living in the same town, suburb, area or marae/hapū community. It also includes the broader meaning of social and cultural communities, such as Pacific communities; ethnic communities and minorities; older people; disabled and mobility-compromised people; low-income groups; women; rural communities; rainbow and LGBTQI+ communities; children and youth; and those experiencing deprivation, ill health or isolation.

Local government: Helping communities to adapt

Local government is the system of locally elected members that represent communities and make decisions about their issues, such as managing climate impacts.

Local authorities have a responsibility to help communities prepare for and adapt to the physical effects of climate change.

In enabling the communities they represent to adapt, these authorities have three main roles:

- as owners of infrastructure that communities rely on for their wellbeing
- as planners and regulators of development
- as agencies closest to exposed communities.

Around New Zealand, many councils are now working in partnership with communities and iwi/Māori. Some are also setting up dynamic adaptive pathways to engage their communities and work towards long-term solutions for highest-risk areas.

As owners of infrastructure that communities rely on for their wellbeing

Local authorities own much of the infrastructure that communities rely on for their day-to-day lives and livelihoods. However, many of these assets are directly at risk from sea-level rise and adverse weather events (eg, more frequent and intense storms and floods).

Authorities will need to carefully manage this infrastructure and design it with higher levels of protection for climate resilience, so their communities can thrive into the future. This includes three waters, local roads and other assets, such as buildings and community amenities, parks, sports fields and airports. Nature-based solutions – such as wetlands, rain gardens and swales, and green roofs and walls – can be effective for addressing flood risk.

As planners and regulators of development

Local authorities have primary responsibility for managing natural hazard risk and adapting to climate change. In particular, they are responsible for planning and regulating¹⁰ development. Directing development away from high-risk areas will be critical to reducing the future exposure of communities to climate risks and minimising the long-term costs of adaptation. The role of councils in urban development planning will require them to consider both adaptation and mitigation for communities. This includes:

- achieving compact urban form that is well linked to public transport and jobs, while being located in areas with less exposure to climate impacts
- directing development away from areas exposed to flooding or wildfire
- requiring additional water storage in urban and rural areas as part of adapting to drought.

Local planning documents inform communities about natural hazard and climate risks, via hazard maps and viewers. They also identify and can protect areas of cultural significance to iwi/Māori and communities that might be affected by climate change.

District councils also operate the Land Information Memoranda (LIM) system. This provides information to people looking to buy a property about the natural hazard or climate risks that might be associated with a property.

¹⁰ The Resource Management Act 1991 requires local government to consider the effects of a changing climate on communities, and incorporate climate change into its frameworks, plans, projects and decision making. All of local government is charged with meeting the current and future needs of communities for infrastructure, local public services and regulatory functions (Local Government Act 2002, section 10(1)(b)).

As agencies closest to exposed communities

Local authorities help communities respond to climate emergencies, such as flooding. Now and in future, councils will need to engage communities in reducing risk and adapting to a changing climate. They will need to lead the discussion about what actions are the best way of supporting the wellbeing of exposed communities.

This may require tough conversations. Options that will reduce long-run costs to communities may be unpopular among some residents in the short term. For example, a council might need to turn down requests for bigger and stronger protection structures, when rising sea levels make these increasingly expensive and ineffective.

Local authorities will need to lead discussions about when and how to protect, accommodate or manage the retreat of communities from climate impacts. Some councils are already holding online conversations and in-person events to address this. A range of councils also has their own climate change plans, work programmes and advisors, and some have declared climate emergencies to drive action.

Case study: Adapting to climate change at the head of Lake Wakatipu

Natural hazards and climate change in a changing landscape

The communities at the head of Lake Wakatipu live with a range of natural hazards that arise from the alpine environment, nearby waterbodies and the geological setting. The environment at the head of the lake is also changing as a result of natural landscape processes.

When and how future changes will happen is uncertain, but climate change is expected to make natural hazards, particularly flooding, more likely and more severe in their impact. Flooding poses a substantial threat to the settlement of Glenorchy, which has been flooded on multiple occasions (significantly in November 1999 and February 2020). Projected natural changes to the landscape (growth of the nearby river deltas, rising riverbed levels and the likely avulsion – or rerouting- of the Rees River) along with the impact of climate change are expected to increase these risks.

The Otago Regional Council is working with the Queenstown Lakes District Council, the local community, iwi and stakeholders to develop a long-term, holistic and sustainable response.

Developing adaptation pathways with the community

The Otago Regional Council has adopted a method called ‘adaptation pathways’ to develop long-term solutions to natural hazards. The Ministry for the Environment (MfE) developed this approach to support community-led decision making in areas affected by natural events and climate change.

The adaptation pathways approach is cyclical and accounts for change and complexity. It uses a 10-step decision cycle that is based around five key questions. The cycle comprises a values, hazard and risk-assessment component (steps 1 to 4), followed by development and implementation of an adaptation strategy (steps 5 to 8), and, later, by a monitoring and review phase (steps 9 and 10). Community engagement is central in the cycle.

So far, the project has carried out a range of surveys, monitoring and technical investigations to better understand natural hazards now and in the future, as well as an assessment of cultural values. The Otago Regional Council has also engaged with the local community to enable them to understand the issues, contribute to the adaptation process and make informed decisions about future adaptation needs.

Supporting change

From this process, the Otago Regional Council will develop an adaptation strategy for the communities at the head of Lake Wakatipu. This information will allow for planning with more certainty in the face of ongoing change and increasing hazard risks. The adaptation pathways approach is relatively new and has mostly been used in coastal hazard environments, rather than in an alpine environment or in areas with multiple hazards. The lessons from this project will have wider benefits for other communities facing similar risks.

What we want to achieve

Communities have a high level of adaptive capacity and are resilient to the impacts of climate change.

- Communities are able make decisions and put resources into suitable adaptive actions.
- Government work programmes are focused on ensuring no one is left behind.
- Local knowledge, including mātauranga Māori, is valued.
- Decision making is transparent and builds and maintains trust.
- Decisions support the tino rangatiratanga (self-determination) of Māori.

Enable communities to adapt **(objective C1)**. This means:

- enabling communities, including our Treaty partners, to provide resources and take action relevant to their unique situation, building and sharing knowledge of local issues in culturally appropriate ways, supporting community engagement and participation in decisions and providing information on adaptation options.

Support vulnerable people and communities **(objective C2)**. This means:

- understanding where our most vulnerable people are, what they need and what they value and providing them with support, knowledge and resources.

Support communities when they are disrupted or displaced **(objective C3)**. This means:

- supporting communities facing climate-related disruption and disasters, so response and recovery can improve their wellbeing and social cohesion.

The health sector is prepared and can support vulnerable communities affected by climate change **(objective C4)**. This means:

- understanding future climate-related health risks and are taking steps early to ensure the healthcare system is ready for these shifting demands. This includes meeting the mental and social wellbeing needs of whānau and communities in emergencies, and supporting them to recover, adapt and thrive.

Community resilience and the basic needs of people look largely the same whether we are dealing with a pandemic or a flood. This is an opportunity to integrate this work into wider social policy as it grows.

The actions that follow are designed to achieve these objectives and address the **human domain** risks in the National Climate Change Risk Assessment (NCCRA). In particular:

- social cohesion and community wellbeing are at risk due to displacement of individuals, families and communities due to climate change impacts.
- that climate change could exacerbate existing inequities and creating new and additional inequities due to differential distribution of climate change impacts.

This focus of this section is on new actions that will contribute to this outcome area. However, a number of existing work programmes across central government can support the resilience of communities. Some of these key programmes include a wide range of initiatives to support community resilience, such as Whānau Ora projects, and funding and work programmes such as Rural Assistance Payments and Oranga Marae.

How we will get there

Critical actions

Raise awareness of climate-related hazards and how to prepare

Timeframe: Years 1–6 (2022–28) – **Lead agency:** NEMA – **Relevant portfolio:** Emergency Management – **Primarily supports:** Objective C1 – **Status:** Current

Enable communities to make emergency preparedness a part of everyday life through public awareness and advice. Increasing public education campaigns and resources, such as www.GetReady.govt.nz and developing tailored information for those who face additional challenges, will help communities understand hazards and support them to take action before, and during, and emergency event.

By the end of 2024 a public education strategy will be developed for natural hazards and increased availability of information on preparedness for extreme weather events.

Develop Health National Adaptation Plan (HNAP)

Timeframe: Year 1 (2022/23) – **Lead agency:** MOH – **Relevant portfolio:** Health – **Primarily supports:** Objective C4 – **Status:** Current

The HNAP will complement the national adaptation plan, and will be supported by regional climate health action plans developed by the health sector, at a regional level. The aim is to prepare the health sector to meet the health needs of communities in relation to the effects of climate change.

A key part of the adaptation planning in health sector is the identification of groups that are vulnerable to the effects of climate change.

Vulnerability can be affected by a wide range of factors including geography, demographics, socio-economic status, physical and mental health status, and family and community support. Vulnerability will be considered alongside risk in the health adaptation planning process.

The HNAP is expected to be completed by the end of 2022 and regional climate health action plans will be developed from 2023.

Supporting actions

Develop the Climate Migration Action Plan

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MFAT – **Relevant portfolio:** Foreign Affairs – **Primarily supports:** Objective C3 – **Status:** Current

Key values include retaining social and cultural identity for Pacific communities and supporting Pacific peoples to live in their own countries where possible. This work aims to support these communities to grow and thrive despite the challenges of climate change-related displacement and migration in a way that is determined in collaboration with Pacific communities themselves, and that values their cultural and local knowledge.

Building community resilience through social cohesion

Timeframe: Years 2–5 (2023–27) – **Lead agency:** MSD – **Relevant portfolio:** Social Development and Employment – **Primarily supports:** Objective C1 – **Status:** Current

This work will improve inclusion and participation in society and build community resilience to lessen instability and isolation caused by climate change. The aim is to support the understanding of diversity within and across communities to allow everyone to feel safe and belong, and to access opportunities.

Strengthen teaching and learning related to climate change

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MOE – **Relevant portfolio:** Associate Education – **Primarily supports:** Objective C1 – **Status:** Current

This work will improve community resilience by addressing inequities in learning outcomes and by supporting local curriculums and marau ā-kura to include understanding and responding to climate change. The aim is to support all children and young people to grow as lifelong learners, connected to the environment and communities and actively involved in a sustainable future.

Improve natural hazard information on Land Information Memoranda (LIM)

Timeframe: Years 1–4 (2022–26) – **Lead agency:** DIA – **Relevant portfolio:** Local Government – **Primarily supports:** Objective C1 – **Status:** Current

Changes to legal requirements for LIMs will help people to make better-informed decisions about natural hazard risk when buying a property and give councils greater certainty about what natural hazard information to include on the LIM. This will link to the suite of information and data portals communities will have about climate risks.

Continue with the reform of the health and disability system

Timeframe: Years 1–3 (2022–25) – **Lead agency:** MOH – **Relevant portfolio:** Health – **Primarily supports:** Objective C4 – **Status:** Current

The way that the health and disability system is structured and the delivery of health services is undergoing a period of reform. The new health and disability system will be simpler and more coordinated, allowing for better and more consistent care that is shaped by the voices of consumers, communities and whānau.

The Public Health Agency within the Ministry of Health will put more emphasis on determinants of health (such as employment and housing) and use data and other sources of intelligence to design policies and services that are better able to prevent disease and to monitor environmental threats to public health.

Health NZ will be responsible for planning and commissioning hospital, primary and community health services. Health NZ will operate four regional offices and each region will work with its districts, located closer to local communities, to develop and implement plans based on local needs to improve the health and wellbeing of communities.

Alongside Health NZ, the Māori Health Authority will have shared responsibility for planning and delivering healthcare. Local iwi/Māori partnership boards will help shape appropriate health and wellbeing services to meet the needs of local communities, through being an influencing and decision-making voice for iwi and Māori at a local level and supporting Te Tiriti partnerships throughout the system.

Assess socioeconomic and climate vulnerability for Māori

Timeframe: Year 1 (2022/23) – **Lead agency:** TPK – **Relevant portfolio:** Māori Development – **Primarily supports:** Objective C2 – **Status:** Current

This action will collect and analyse social data against climate data to determine where support for resilience is most needed. This will allow the Government to better understand what support is needed to strengthen resilience for Māori communities.

Continue to overhaul the welfare system

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MSD – **Relevant portfolio:** Social Development and Employment – **Primarily supports:** Objective C2 – **Status:** Current

This action will make ongoing improvements in support, such as for employment, health and communities, and in incomes for those interacting with the welfare system. This aims to achieve the Government’s vision of a welfare system that ensures people have an adequate income and standard of living, are treated with and can live in dignity and are able to participate meaningfully in their communities.

Connect communities to wider response and recovery support

Timeframe: Years 1–6 (2022–28) – **Lead agency:** NEMA – **Relevant portfolio:** Emergency Management – **Primarily supports:** Objective C3 – **Status:** Current

This action will continue work with central and local government, communities, iwi, organisations and others to support effective, integrated disaster response and recovery. This allows for communities to be assisted through disaster events by networks that are locally led, regionally coordinated and nationally supported.

Future work programme proposals

Expand current funding for proactive community resilience

Timeframe: Years 1–6 (2022–28) – **Lead agency:** TPK – **Relevant portfolio:** Māori Development – **Primarily supports:** Objective C1 – **Status:** Proposed

This will seek to expand funding provided to Māori to build their community resilience through the COVID-19 pandemic and plug funding gaps for communities to carry out their long-term resilience plans. Funding would be decentralised by expanding the scope of funds provided through Whānau Ora. Whānau Ora reaches Māori and Pacific communities as some of our most socio-economically vulnerable, but is accessible to all communities. Communities will be able to be funded to take proactive action to future-proof and adapt to the best of their ability, for whatever adversity comes their way.

Assess healthcare service resilience

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MOH – **Relevant portfolio:** Health–
Primarily supports: Objective C4 – **Status:** Proposed

The aim of this action is to understand the vulnerability of the service to climate events, consider physical risks to infrastructure, and changes in illness patterns and vulnerability. This will help to ensure that communities can continue to access the healthcare services they need, even in the face of climate change-related adversity.

Case study: Wildfire preparedness at Mount Iron, Wānaka

Extreme fire weather is increasing in New Zealand and the number of people living within the rural–urban interface is also rapidly growing. During the 2020–21 fire season, more homes were destroyed than in any other fire season in the past century.

The conditions that led to Australia’s devastating 2019–20 ‘Black Summer’ fires are likely to occur in New Zealand every 3 to 20 years – specifically in areas of Central Otago, the Mackenzie Country and Marlborough. Research suggests that the general public does not fully understand the increasing wildfire risk or their mitigation options. More action is needed to build resilience that enables communities across New Zealand to respond to this increasing risk.

Some New Zealanders have started taking actions as individuals and as a collective community to prepare to respond to increasing wildfire risk. A case study of the permanent Mount Iron residents in Wānaka found that participants had high awareness of and anxiety about wildfire. Their views had been amplified by the recent wildfire at Lake Ōhau, 70 kilometres away, which destroyed half the village (48 houses) in October 2020.

Mount Iron residents have voiced concerns about the increasing wildfire threat to both lives and property. Their concerns focus on local development planning decisions and rules – such as restrictions on removing protected native kānuka vegetation around their properties – as well as flammability of cedar cladding of houses and poor access for fire trucks on residents’ one-way evacuation routes.

Actions across other outcome areas also contribute to resilient communities

The work to reduce pests and diseases set out in the section on the natural environment will also reduce risk to human health. These actions will support the development of the Health National Adaptation Plan.

Climate-resilient infrastructure will support greater community resilience. The needs of communities are strongly connected to the actions in the section on homes, buildings and places, as a community’s wellbeing is linked with the housing, gathering places, sites of significance and wāhi tapu within it. Relevant actions include those around property resilience, building resilient housing and connecting between cultural heritage, climate change and wellbeing.

Communities questions

32. Do you agree with the outcome and objectives in this chapter?

Yes

33. Do you agree with the actions set out in this chapter?

Yes

There should also be a responsibility for developers to create a Climate Change risk assessment and mitigation for their development, to ensure that any climate risks to their new builds have been considered and acted upon, prior to construction.

34. What actions will provide the greatest opportunities for you and your community to build climate resilience?

Developing the Health National Adaptation Plan (HNAP) and legislating putting natural hazards on LIM reports.

35. Are there additional actions central government should consider to:

a. support your health and wellbeing in the face of climate change?

Central Government could consider education around the support networks that are set up ready to respond to a crisis, for example: advertising the fact that there is a designated safe zone in the event of a flood. Reassurance is essential to calm, planned responses.

b. promote an inclusive response to climate change?

No

c. target support to the most vulnerable and those disproportionately impacted?

None identified at this time.

36. What do you think are the most important actions that will come from outside of central government (eg, local government, the private sector or other asset owners, iwi, hāpu, non-government organisations, community groups) to strengthen community resilience in the face of climate change?

Our ratepayers need community-level understanding of what the risks are and what options they have, and it is our role as a Council to provide that and facilitate collaboration, bringing different groups together to help one another. Co-ordination, co-operation, and communication are the principles that should guide all actions.

37. Are there additional actions could be included in the national adaptation plan to help strengthen climate resilience for iwi, hāpu and whānau?

None we are aware of at this time.

Economy and financial system

In this section:

- [Why we need to take action](#)
- [What we want to achieve](#)
- [How we will get there](#)
- [Actions across other outcome areas also contribute to a resilient economy and financial system](#)

Why we need to take action

Climate change is already affecting the economy of Aotearoa New Zealand. It is increasing existing risks, such as floods and droughts, and has resulted in sea-level rise.

Between 2007 and 2017 the contribution of climate change to floods and droughts alone cost New Zealanders an estimated \$840 million in insured damages and economic losses (Frame, et al, 2019). The scale of the long-term economic costs and benefits of climate change will depend on actions right across society.

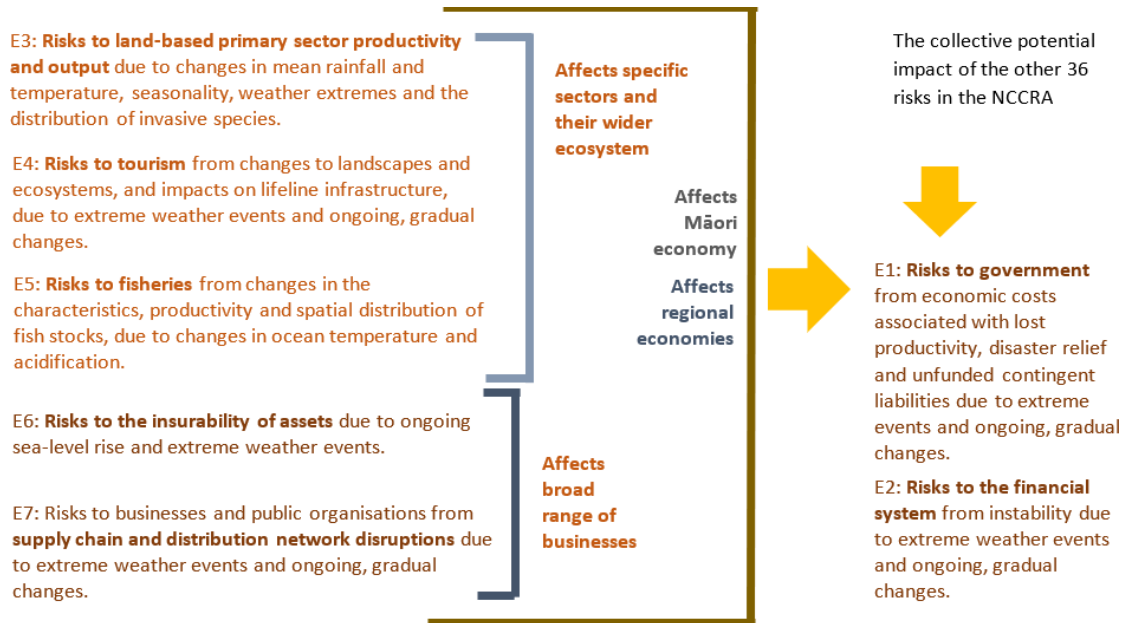
In 2021, less than 10 per cent of firms had assessed the risks to their business from a changing climate, and less than 20 per cent intended to take action to reduce their risks over the next five years. This lack of action increases business vulnerability to climate impacts (Statistics New Zealand, 2022), (Climate Change Adaptation Technical Working Group, 2017).

Central government will play a role in taking action, for example, through legislation, funding or regulation to incentivise others to reduce their risk.

Local government will take decisions, for example, on land use or local infrastructure.

Businesses (including iwi interests) and private citizens exposed to climate risks will likely consider future climate impacts when making long-term decisions, such as where to locate, how to earn an income or what type of insurance to buy.

Figure 7: The seven economic risks and their cascading impact across the economy



Source: Economic risks from the National Climate Change Risk Assessment and the Ministry of Business, Innovation and Employment.

Impacts we are seeking to address

Key export industries failing to adapt

Land-based primary industries, fisheries and aquaculture, and tourism are the most exposed industries as they depend on climate-sensitive natural resources (Ministry for the Environment, 2020a). These three industries and their manufactured products form a significant part of the economy and comprise over 60 per cent of exports.¹¹

Failure of firms in these industries to adapt adequately would reduce their productivity and potentially their viability. Impacts would flow on to their suppliers and customers and to New Zealand’s export earnings (Climate Change Adaptation Technical Working Group, 2017).

Exposed local economies failing to adapt

The impacts will not be evenly distributed across New Zealand. Many regional economies rely heavily on the three exposed industries, and those that are located in hazardous areas (eg, low-lying land) will be doubly exposed. Failure to adapt could lead to business closures and job losses, which if widespread could hollow out some communities.

Disproportionate impacts on iwi and Māori

Iwi and Māori are heavily invested in land-based primary industries, tourism and fisheries, which all have a significant Māori workforce.

¹¹ The three sectors contributed about 62 per cent of export earnings for the year ended March 2020. Source: Stats NZ data on [goods and services trade by country](#), and the [tourism satellite account](#), both for the year ended March 2020.

Māori collectively own approximately 40 per cent of fisheries quota, and have diversified interests across the sector, including catching, processing, marketing and food services. Māori also own 40 per cent of commercial forest. In 2018, gross domestic product (GDP) from Māori tourism was estimated at just over \$975 million (BERL, 2021).

Economic inequity means that some Māori businesses and workers have less capacity to adapt, and climate-related costs and disruption could entrench those inequities. At the same time, Māori knowledge of sustainable practices and holistic economic models offer unique ways to adapt. Properly resourced, Māori can take a leadership role in economic adaptation.

Infrastructure, business and housing assets are becoming less insurable

Some assets could become uninsurable (creating further risks if they are used as collateral). The value of buildings exposed to coastal flooding could increase from NZ\$12.4 billion now to NZ\$26 billion for sea-level rise of 0.6 metres, and NZ\$44 billion at 1.2 metres (Paulik et al, 2019).

Insurance retreat would likely reduce private and public asset values, making households and firms or public entities less able to invest in adaptation.

There are likely to be more insurance claims, greater damage repairs and higher premiums. Claims for extreme weather events hit a record \$321.6 million in 2021, breaking the record last set in 2020 at \$274 million (Insurance Council of New Zealand, 2021).

Disrupted supply chains

Local and global supply chains are critical to the functioning of the economy. Supply is subject to disruption from extreme weather (eg, flooding, power outages) and longer-term climate changes that reduce the supply of certain goods.

Disruptions can range from the very local (eg, a washed-out road to a major tourist site), to major freight hubs, through to global distribution networks. The Intergovernmental Panel on Climate Change (2014) suggests the effects of climate change globally (and flow-on effects to our supply chains) may be more significant to our economy than the direct impacts within New Zealand.

Reduced financial stability

Financial stability means having resilient banks, insurers and other financial institutions. It means we have a system that can withstand severe but plausible shocks and continue to provide the services we all rely on.¹²

One of the main ways climate change creates risks to stability is through the physical impacts on collateral (eg, extreme weather damaging assets, such as residential housing or farmland). The transition to a low-emissions economy may also undermine the financial system if it leads to significant shifts in asset values or high costs of doing business.

¹² Reserve Bank of New Zealand. Financial stability. Retrieved from <https://www.rbnz.govt.nz/financial-stability> (4 April 2022).

Fiscal impacts of extreme weather and sea-level rise

In its Statement on the Long-term Fiscal Position, Treasury (2021) modelled the impact of more frequent and severe storms and droughts. The median impacts by 2061 appeared modest (net debt 3.77 per cent of GDP higher than baseline).

This analysis suggested that the Government's fiscal position was relatively resilient. However, these national impacts did not reflect the severe shocks felt by affected communities or local government entities. The fiscal impacts could be greater, given that the analysis did not consider sea-level rise, non-linear or 'tipping-point' changes, or effects beyond 40 years.

Reduced Crown revenue

The Government may also face lower revenue if taxes fall or if productivity or GDP reduces, and the costs to replace or repair its own assets increase.

What we want to achieve

A high wage and low emission economy, which adapts and builds resilience to a changing climate

The Government will take into account a range of considerations in achieving this outcome.

- Economic activity is increasingly becoming carbon neutral, circular and climate resilient.
- Innovation lifts productivity and generates sustainable solutions.
- Te Tiriti partners work together for mutually beneficial economic opportunities.
- Vulnerable sectors have reduced their climate risks, and the economy has diversified towards high-value, less climate-exposed industries.
- Businesses and households have the skills, resources and incentives to reduce their economic risks to climate impacts.
- Every household can meet its material needs.
- The foundation is a stable financial system and clear public/private accountabilities.

The 2020 National Climate Change Risk Assessment (NCCRA) identified significant risks to governments and to the financial system. Underlying these risks, it identified in particular risks to primary industries and tourism, distribution networks and the insurability of assets. These in turn could generate risk to the overall economy (see figure 7). The two objectives below respond to these risks.

Sectors, businesses and regional economies can adapt. Participants can identify risks and take action (**objective EF1**). This means:

- providing businesses with the tools and information they need to respond to climate risks
- reducing barriers to adaptation and innovation
- sectors most vulnerable to near-term or significant change (tourism, land-based primary sector, fisheries) can take action now to reduce costs over time
- providing regions with what they need to make informed assessments of their risk and reduce their exposure to climate-driven economic disruptions.

A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks (**objective EF2**). This means:

- financial entities can identify, disclose and manage the risks to their business.
- Insurance access and affordability is understood and managed.

How we will get there

Critical actions

Deliver the national Freight and Supply Chain strategy

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MOT – **Relevant portfolio:** Transport –

Primarily supports: Objective EF1 – **Status:** Current

The national Freight and Supply Chain strategy will present a long-term and system-wide view of the freight system. Climate adaptation is being considered through the resilience objective, to ensure New Zealand’s freight and supply chain system is resilient, reliable, and prepared for potential disruption. This will inform investment by the Government, councils and private sector players.

It looks across industries, sectors and modes, to identify challenges and opportunities in the long term. This will lay the foundation for identifying any actions to reduce the risk of supply chain disruptions on businesses, industries and consumers.

By the middle of 2023, the Government has launched the national Freight and Supply Chain strategy.

Deliver the fisheries system reform

Timeframe: Years 2–5 (2023–26) – **Lead agency:** MPI – **Relevant portfolio:** Oceans and Fisheries – **Primarily supports:** Objective EF1 – **Status:** Current

The Government is progressing work on the Fisheries Amendment Bill which includes several legislative changes to the Fisheries Act 1996 that aims to strengthen and modernise New Zealand’s fisheries management system. The Bill will allow for more agile and streamlined decision making in response to changes in fish stock abundance, due to the effects of climate change, by enabling development of the pre-set decisions rules. The pre-set decision rules will allow adjustment of the catch limits and other sustainability measures within pre-agreed limits in response to change in abundance without extensive consultation. By 2024 the Government has introduced the Fisheries Amendment Bill.

Deliver the Aquaculture Strategy

Timeframe: Years 1–4 (2022–26) – **Lead agency:** MPI – **Relevant portfolio:** Oceans and Fisheries – **Primarily supports:** Objective EF1 – **Status:** Current

The Government’s Aquaculture Strategy aims to help sustainably grow the aquaculture industry in New Zealand. One of its objectives is to support the industry to adapt to climate change.

Actions include forecasting the effects of climate change on the aquatic environment and supporting actions for biosecurity, resilience, supporting industry to transition to hatchery spat production, and spatial planning approaches informed by climate change considerations to enable industry growth and adaptation.

By 2024 the Government releases annual implementation plans for the Aquaculture Strategy, and report annually on the environmental effects of aquaculture.

Support high-quality implementation of climate-related disclosures and explore expansion

Timeframe: Years 1–6 (2022–28) – **Lead agencies:** MfE, MBIE supported by the XRB and FMA – **Relevant portfolios:** Climate Change; Commerce and Consumer Affairs – **Primarily supports:** Objective EF2 – **Status:** Current

The Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 requires approximately 200 of New Zealand’s largest financial market participants to analyse and publicly disclose annually their climate-related risks and opportunities. This work will explore how entities consider climate-change risks and opportunities and will ensure that the effects of climate change are routinely considered in business, investment, lending and insurance decisions. We will also explore extending the mandatory climate-related disclosures regime to cover a broader range of activities, for example, public entities at the national and local level. As climate risks and opportunities are more accurately factored into pricing and become more transparent, we expect this will shift investment decisions away from high-risk areas, and towards investments that support a sustainable, low-emissions and financially stable economy.

Key actions to support implementation are led by MfE and the External Reporting Board (XRB), and include promoting industry-led sector-level scenario analysis approaches, facilitating improved access to data & collaborating with international organisations to support clear, comparable, and consistent climate disclosures.

By 2024, the Government has decided whether to extend mandatory climate-related disclosure requirements to public entities.

RBNZ supports the stability of the financial system

Timeframe: Years 1–2 and ongoing (2022–24) – **Lead agency:** RBNZ – **Relevant portfolio:** Finance – **Primarily supports:** Objective EF2 – **Status:** Current

The Reserve Bank of New Zealand (RBNZ) is taking action to help regulated financial entities better identify and manage climate risks. These include:

- Introducing climate-related stress tests that model the effect of severe but plausible scenarios on the balance sheets of regulated financial institutions
- incorporating climate change in scheduled supervisor engagements with the management and boards of regulated entities
- developing guidance on managing risk for the entities the RBNZ regulates.

By August 2024, the RBNZ will have climate change considerations increasingly integrated into its supervisory, stress testing and policy work.

Develop options for home flood insurance issues

Timeframe: Years 1–2 (2022–23) – **Lead agency:** Treasury – **Relevant portfolio:** Earthquake Commission – **Primarily supports:** Objective EF2 – **Status:** Current

Work is underway to better understand the scale and timing of insurance market changes due to improved information about risks supporting more granular risk-based pricing by insurers, and due to the increasing frequency and severity of flooding events being exacerbated by climate change. This work includes exploring options to support access and affordability of insurance for floods.

Home insurance supports New Zealand’s resilience to extreme weather events, such as floods, and helps manage climate change risks. The Government intends to develop options to ensure home flood insurance continues to play an appropriate role in supporting community resilience.

This work has important links with other adaptation initiatives, such as improved land-use planning, that reduce climate-related risk and support the insurability of assets.

By the end of 2022, the Government has received advice on flood insurance options and agreed to next steps.

The role of insurance in responding to flood risk

Climate change creates challenges for the insurability of assets, such as residential buildings and homes. The Government has choices about how it responds to these challenges. The Government’s primary focus is on flood insurance for residential buildings. The choices include potentially supporting a national flood insurance scheme for residential buildings.

Climate change will make floods more severe, frequent and costly. The nature of this change and its impact will differ depending on the type of flood (eg, river, surface or coastal flooding) and the specific location involved. The timing and course of such change are relatively uncertain. At the same time, the availability and quality of information, data and modelling on flood risk and climate change (including forward-looking assessments of losses) are improving progressively over time.

Risks such as flooding can be managed in a number of ways, including by:

- avoiding the risk through land-use planning (eg, minimising new builds in high-risk areas)
- controlling the risk (eg, public flood defences, asset-specific flood mitigations, ‘retreat’ from high-risk areas)
- insuring the risk to help communities recover from any floods
- accepting the risk with a view to dealing with the consequences after the event.

The increase in underlying flood risk and availability of information over time is likely to challenge the insurability of flood risks for some assets such as homes. This is because these circumstances no longer meet some of the key characteristics needed for risks to be privately insurable. For example, it becomes increasingly uneconomic for either an insurer or an asset owner to enter into an insurance arrangement (at a proper price) if an asset experiences frequent and significant losses.

This might lead to higher premiums and/or ‘insurance retreat’, such as higher excesses, limits on cover and, in some cases, loss of access to insurance entirely. Any significant and widespread increase in premiums or insurance retreat would likely result in:

- lower wellbeing for affected homeowners, both pre-flooding (eg, income, stress, reduced market value of existing assets, reduced access to finance) and post-flooding (eg, losses)
- potential fiscal and policy implications for the Government if pressed to support uninsured and underinsured homeowners after a flood.

Another result of insurance retreat will be that private insurance plays a smaller role than at present in preventing or responding to damage caused by floods. In addition, loss of insurance or higher premiums are likely to provide incentives for asset owners to manage their risk in other ways, including potentially by taking measures to adapt to the risks (such as seeking the development of public flood defences or moving assets).

The Government has choices about its involvement in managing flood risk in the short term and later as climate change increases those risks. Additionally, the Government has the choice of whether or not to support insurance markets to continue providing flood insurance (and if, it does provide support, in what ways).

In deciding on its position, the Government will weigh up various factors, including:

- who should bear these risks and how they are shared across society, including considering to what extent these risks are different to other risks
- costs and benefits of various options to manage risks
- who is best placed to manage and make decisions about managing these risks (eg, homeowners, local government, central government)
- to what extent any government involvement is transitional or temporary
- the risk of unintended consequences.

The Government needs to consider the short-, medium- and long-term impacts. It will need to consider the trade-offs and risks of any decision to support flood insurance in the context of this national adaptation plan. This includes reducing incentives and masking market signals that could otherwise promote actions to reduce underlying flood risk.

Supporting actions

Consider climate risk in economic and fiscal monitoring and forecasting

Timeframe: Years 1–6 (2022–28) – **Lead agency:** Treasury – **Relevant portfolio:** Finance – **Primarily supports:** Objective EF2 – **Status:** Current

Treasury’s six-monthly economic updates are a core mechanism to monitor and forecast the economic and fiscal environment. This includes the impact of shocks (eg, COVID-19 or natural disasters) on the Crown’s financial position, as well as tracking long-run changes. The updates highlight known quantifiable and unquantifiable climate adaptation risks as a tool to assist in fiscal and economic management.

Design and implement the Farm Monitoring Programme to determine farm performance

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MPI – **Relevant portfolio:** Agriculture – **Primarily supports:** Objective EF1 – **Status:** Current

This action promotes land use that brings more value and is better for the environment, including changing use if necessary. It provides on-farm emissions data to farms and orchards, increasing the primary sectors covered, and enabling sectors to benchmark between similar farm types.

Implement the Government response to the Prime Minister's Chief Science Advisor's report on commercial fishing

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MPI – **Relevant portfolio:** Oceans and Fisheries – **Primarily supports:** Objective EF1 – **Status:** Current

This report makes several recommendations for fisheries management and for commercial fishers. The Government response is underway and will likely include actions that support innovation across the system, progress an ecosystem approach to fisheries management and protect habitats of significance to fisheries management.

Support the Aotearoa Circle Climate Change Adaptation Strategy for Seafood Sector

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MPI – **Relevant portfolio:** Oceans and Fisheries – **Primarily supports:** Objective EF1 – **Status:** Current

Building on scenario planning, this action is a collaboration between the Government, major seafood sector leaders, environmental non-government organisations, iwi representatives and the research community. The strategy will set out a shared 10-year vision and goals, and actions to help achieve these. The strategy will increase the fisheries sector's capability and resilience to climate-related risks. It includes actions to ensure adaptation information is more integrated and accessible, and promote ecologically and economically efficient fishing and aquaculture practices.

Deliver the Tourism Industry Transformation Plan (ITP)

Timeframe: Years 1–3 (2022–2025) – **Lead agency:** MBIE – **Relevant portfolio:** Tourism – **Primarily supports:** Objective EF1 – **Status:** Current

The goal of this work is regenerative tourism. The first phase focuses on 'better work' and the second phase on the environment. It will likely include further transition and adaptation plans over the term of this first national adaptation plan. This provides the opportunity for a sector-wide assessment of risks and potential actions.

Meeting the costs of a climate-resilient tourism sector

Timeframe: Years 1–2 (2022–24) – **Lead agency:** MBIE – **Relevant portfolio:** Tourism – **Primarily supports:** Objective EF1 – **Status:** Current

Currently international visitors do not directly pay for many products and services they use, where these are funded by local communities. The Ministry of Business, Innovation and Employment (MBIE), directed by the Minister of Tourism, is reviewing the settings for the International Visitor Conservation and Tourism Levy (IVL). This includes ensuring that international visitors contribute to resilient, adaptable infrastructure and the natural environment they use as part of the visitor experience. Resilient infrastructure, including a healthy environment, will reduce the risks from extreme weather. This action will support a focus on spending priorities of the IVL, as well as any further work across the life of the national adaptation plan (eg, other tools) to further support adaptation and climate resilience in tourism.

Leverage government procurement for climate outcomes

Timeframe: Year 1 (2022/23) – **Lead agency:** MBIE – **Relevant portfolio:** Economic and Regional Development – **Primarily supports:** Objective EF1 – **Status:** Current

This action will check that the current government procurement policy framework enables mitigation and adaptation in government investments. The greatest opportunity will likely be in construction contracts, making buildings and infrastructure resilient to a changing climate and reducing carbon emissions and waste. This links to the homes, buildings and places action plan.

Monitor residential insurance premiums

Timeframe: Years 1–2 (2022–24) – **Lead agencies:** Treasury, EQC – **Relevant portfolio:** Earthquake Commission – **Primarily supports:** Objective EF2 – **Status:** Current

Monitoring residential premiums and uptake of insurance gives a better understanding of the scale of shifts in insurance availability and affordability.

Improve consumer understanding of property insurance pricing and risks

Timeframe: Year 1 (2022/23) – **Lead agency:** Treasury – **Relevant portfolio:** Finance – **Primarily supports:** Objective EF2 – **Status:** Current

Information sheets will help consumers identify, manage or even reduce their risks to climate change. This links to the work on Land Information Memoranda, in that greater information disclosure can help people make more informed decisions on where to buy and build property.

Continue prioritising research and investment in climate-related science

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MBIE – **Relevant portfolio:** Research, Science and Innovation – **Primarily supports:** Objective EF1 – **Status:** Current

The Government has a range of science funding programmes that support innovative adaptation by pushing the boundaries of knowledge and transferring this knowledge. These include:

- Vision Mātauranga Capability Fund, which aims to unlock the science and innovation potential of Māori knowledge, resources and people.
 - The Endeavour Fund. In 2020, the MBIE-run Endeavour Fund for scientific research awarded the National Institute of Water and Atmospheric Research (NIWA) \$15 million over five years to NIWA, to produce New Zealand’s first consistent national flood hazard and risk assessment (Mā te haumarū ō nga puna wai ō Rākahautū ka ora mo ake tonu: Increasing flood resilience across Aotearoa). This will identify risks and help communities and sectors take early action to reduce costs over time by showing where flooding is likely, and by identifying the vulnerability of communities and assets.
 - The STRAND project (an interdisciplinary Royal Society of New Zealand Marsden Fund project led by the University of Otago) is exploring climate-related risks to residential property values across space and time, and the implications for financial stability.
 - The Whakahaora Extreme Events and the Emergence of Climate Change programme is studying extreme weather in climate and weather systems, in hydrological, biological and economic systems.
 - Strategic Science Investment Funds. Examples include
 - The Antarctic Science Platform, which improves scientific understanding of pressing issues such as climate change and ecosystem resilience.
 - The Enhancing Land Use Platform, which supports research that enables New Zealanders to better measure and manage their land resources, reduce greenhouse gas emissions, and manage the environmental impacts of land use.
 - Weather and Climate Hazards Platform, which improves understanding of large-scale weather and climate systems through numerical prediction techniques, monitoring and advanced measurement (eg, predicting extreme weather events and impacts, climate adaptation and mitigation).
 - The Deep South National Science Challenge. The aim of this 10-year research programme, finishing in 2024, is to improve understanding of New Zealand’s changing climate. It will aid timely decisions on adaptation by building New Zealand’s evidence base and providing sectors and communities with insights and information. This is part of addressing gaps in
-

our knowledge and building our monitoring capabilities. There are key inputs to decisions to be made at all levels of society on how to adapt to changing climate conditions.

Continue delivering the Sustainable Land Management and Climate Change (SLMACC) and Greenhouse Gas Inventory research programmes

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MPI – **Relevant portfolio:** Agriculture – **Primarily supports:** Objective EF1 – **Status:** Current

This work will fund research and develop tools to support the sector to better adapt to climate change, measure emissions and mitigate land-use impacts on fresh water. It includes science extension and policy research and ability to respond to social impacts of climate change.

Continue delivering the Sustainable Food and Fibre Futures Fund

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MPI – **Relevant portfolio:** Agriculture – **Primarily supports:** Objective EF1 – **Status:** Current

The fund supports innovative projects that design and test new approaches and solutions to risks such as climate change in the primary sector. It includes a research call for regenerative agriculture projects.

Case study: New Zealand Seafood Sector Adaptation Strategy, 2021–30

*“Only a collaborative, sector-wide adaptation strategy can address the impacts of climate-related risk in the seafood sector.” **

Climate risk to fisheries is one of the 43 risks identified in the National Climate Change Risk Assessment. In 2020, the Aotearoa Circle brought together 23 organisations in the seafood sector to collaborate on a forward-looking climate risks and opportunities assessment. This was based on the international best-practice Task Force on Climate-related Financial Disclosures framework. A key finding was that the next decade will be crucial for the seafood sector to enhance its resilience and adaptive capacity.

The Aotearoa Circle collaboration included industry players, government, iwi, and community stakeholders. Based on a risk-and-opportunity analysis of climate scenarios, the group developed and adopted a final Seafood Sector Adaptation Strategy that has a comprehensive programme of actions, to be implemented from 2021 to 2027.

“As kaitiaki we work together to adapt to climate change and ensure a resilient future.”

The strategic goals of the adaptation strategy are bold leadership, resilient prosperity, practical knowledge and values-based governance. Each goal has several commitments that will be implemented out to 2027.

- Bold leadership will ensure stakeholders can better understand their climate risks and opportunities and drive the implementation of adaptation actions.
- Resilient prosperity will develop adaptive capacity, for example, by funding and researching opportunities to diversify markets. It will also look to enhance the resilience of the marine environment.
- Practical knowledge will enable the development and sharing of all kinds of relevant information and knowledge across the sector. It will ensure that part of monitoring and evaluation of adaptation options is to gather lessons to inform decision making.

- Values-based governance will mean stakeholders from across the seafood community spectrum will collaborate with, and actively support, policy makers as climate change is mainstreamed into legislation, regulation and policy settings.

This is one of the first examples of a sector working together to produce an adaptation strategy, including an implementation roadmap. It is an opportunity to bring lasting co-benefits to habitats, ecosystems, communities and businesses.

The participants found the process invaluable in helping them to prepare and build resilience in their organisations for the changing climate, and the opportunities and challenges that might bring.

** All quotes in this case study come from the Aotearoa Circle Climate Change Adaptation Strategy for the Seafood Sector.*

Future work programme proposals

Support Māori small business resilience and transitions

Timeframe: Years 1–4 (2022–26) – **Lead agency:** TPK – **Relevant portfolio:** Māori Development – **Primarily supports:** Objective EF1 – **Status:** Proposed

The aim of this work is to support Māori small and medium enterprises to develop low-emissions growth strategies, respond to climate-related risks and opportunities, and adopt resilient ways of working. Businesses would commit to reducing their emissions or improving their resilience to physical climate events.

Deliver the Māori agribusiness extension

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MPI – **Relevant portfolio:** Agriculture – **Primarily supports:** Objective EF1 – **Status:** Proposed

This action will deliver a tikanga-based support programme for whenua Māori, developed by Māori for Māori. This will empower Māori landowners and agribusiness to take a te ao Māori approach to adaptation and lowering emissions. It will extend the current pilot programme, which offers resources and support to Māori land-owning collectives. The extended service will also set up a network of skilled and trusted Māori advisors to support Māori land owners to reduce emissions, and improve preparedness for physical climate impacts.

Research business adaptation preparedness & provide guidance for small businesses to adapt

Timeframe: Years 1–6 (2022–28) – **Lead Agency:** MBIE – **Relevant Portfolio:** Small Business – **Primarily supports:** objective EF1 – **Status:** proposed

This will help small businesses reduce their climate risks through the provision of targeted guidance and information. The guidance will be based on research that will help to understand what firms are doing to adapt, and the pain points for business owners. The research will set a baseline for current action, inform future policy, and drive guidance and resources for small businesses.

Establish innovation grants, such as project grants

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MBIE – **Relevant portfolio:** Research, Science and Innovation – **Primarily supports:** Objective EF1 – **Status:** Proposed

These grants will boost private sector research and development investment. They will share the risk with New Zealand companies, and foster more research and development. This means more climate-focused innovation should happen faster, better enabling adaptation action.

Promote more industry partnership networks

Timeframe: Years 1–6 (2022–28) – **Lead agency:** MBIE – **Relevant portfolio:** Research, Science and Innovation – **Primarily supports:** Objective EF1 – **Status:** Proposed

This action will pool knowledge and resources to solve sector problems. The partnerships will recognise the complexity and interrelatedness of climate adaptation issues, and the need for sophisticated networks to test, scale up and spread innovation to help address climate risks. These networks will speed up the connections and relationships needed to implement change at pace.

Identify the impacts of climate change on regional economies

Timeframe: Years 1–3 (2022–25) – **Lead agency:** MBIE – **Relevant portfolio:** Economic and Regional Development – **Primarily supports:** Objective EF1 – **Status:** Proposed

This work will involve modelling the economic impacts of a changing climate on regional economies and providing guidance for assessing climate impacts in local economic decision making. This will help regions make informed assessments of their risks in their planning processes and reduce their exposure to climate-driven economic disruptions. Regional economic preparedness will also be bolstered by other proposals in the national adaptation plan, such as the Māori-led partnership.

Case study: Growing kai under increasing dry-climate adaptation and the primary sector

*“Adaptation is about surviving and thriving in the face of change.”**

Climate change is increasing the frequency and severity of drought in New Zealand; from 2007 to 2017, drought cost the country around NZ\$720 million. The primary sector is particularly vulnerable to drought and can expect conditions to get drier over the coming decades.

Climate disasters place a huge strain on the lives of farmers and growers, particularly in relation to their mental health. To reduce the economic risks of drought, and build climate resilience in farmers and growers, a national long-term climate change adaptation strategy is needed.

“Unless we work together, we are going to lock ourselves into the status quo.”

To develop a strategy that serves all stakeholders, a National Science Challenge consortium brought together farmers, growers, industry bodies, researchers and government. Online webinars and a one-day symposium were held in 2021, after which insights and findings from them were captured in the *Growing Kai Under Increasing Dry* report (2021).

The report emphasises that it is vital for the primary sector to adapt so that it protects its economic viability and that wide-ranging collaboration is essential.

“We can be either proactive or reactive, but climate change impacts are inevitable.”

The report provides a list of adaptation solutions for the primary sector. Suggestions include: connecting policy, research and on-farm practice; planning for the long term rather than short-term planning to respond to events; and enabling behaviour change and diversifying farming activities.

The report notes that although incremental adaptation has been happening for a decade, transformational change is now required. In contrast to incremental adaptation, which involves actions such as changing seed-sowing dates, transformational adaptation involves identifying novel land-use opportunities.

“Neither a top-down nor bottom-up approach alone will do.”

The report sets out key roles and responsibilities for stakeholders. Farmers and growers are the decision makers on the ground; industry bodies work as knowledge brokers for adaptation; researchers contribute new possibilities for adaptation and co-develop solutions; and the Government has a significant role to play through enabling innovation, investment and flexibility.

** All quotes in this case study come from the National Science Challenge report Growing Kai Under Increasing Dry.*

Case study: Flood Re – a flood reinsurance scheme in the United Kingdom

Flood Re is a UK reinsurance scheme that supports the affordability and availability of flood insurance for those homes that are at highest risk of flooding (around 1 to 2 per cent of UK homes). The scheme caps flood insurance premiums and cross-subsidises flood insurance costs between homeowners.

Flood Re is owned and operated by the insurance industry. It is funded by a mix of compulsory levies on all residential-property insurers and reinsurance premiums on flood-prone homes that are reinsured with the scheme.

To manage any adverse incentives Flood Re might create, it is only available to homes built before 1 January 2009; new homes face full-market risk pricing, which discourages building in high flood-risk locations. In addition, Flood Re is planned to end by 2039. This is because the scheme is intended to manage the transition to market prices and the end date preserves the incentive for risk reduction. By 2039, a greater proportion of homes will be in lower flood-risk areas, which will reduce the shock when transitioning back to market prices.

Alongside Flood Re, the UK Government has committed to major investment in flood risk reduction. It is intended that flood risk will be largely addressed by the time Flood Re ends in 2039, which will also help with a smooth transition back to market-based insurance premiums that take account of risk level.

The UK is considering making changes to the scheme to improve the incentives for adaptation. Some possible changes are to introduce premium discounts for properties that have taken resilience measures and provide additional payments that support claimants to rebuild more resiliently.

A five-year review of Flood Re found that 80 per cent of homes with previous flood claims had their insurance price reduced by more than 50 per cent. A 2018 UK government survey found that people living in areas of high flood risk considered household insurance to be more affordable and readily available than it had been in 2015.

Actions across other outcome areas also contribute to a resilient economy and financial system

Given the cascading nature of climate risk, and the extent to which Aotearoa New Zealand's economy is interconnected with all the other outcome areas in this plan, a significant number of actions from the previous sections will also contribute to a high-wage and low-emissions economy, which adapts and builds resilience to a changing climate. The following are some notable examples.

- **Natural environment: Implement the Department of Conservation Climate Change Adaptation Action Plan:** This plan includes actions for heritage, recreation and infrastructure of public conservation land and water. The actions help to reduce risks from weather events to tourism activities and protect the quality of heritage and environmental sites, which are important for our tourism industry.
- **Natural environment: Implement the Water Availability and Security work programme:** As climate change is making the availability of freshwater more variable across the country, this is of key concern to the primary sector. This programme will help maintain the health of waterways, taking its lead from the National Policy Statement on Freshwater Management.¹³ It will help farmers adapt through making technological efficiencies and mapping areas suitable for water-intensive crops. This action will help avoid disruptions to business activity and land use, and potential flow-on impacts to sectors, regions and the economy as a whole.
- **Natural environment: Provide a forestry planning and advisory service:** This service will promote better land use, tree selection, resilience and suitability for the landscape. It will support the primary industry to identify climate risks and take action.
- **System-wide: Deliver the Future Pathways work programme:** This will position our research, science and innovation system for the future. It includes focusing resources on national goals (such as climate change) and exploring how research can best honour Te Tiriti obligations and promote mātauranga Māori.

A future-fit research, science and innovation system that is connected, resilient and adaptable can more effectively respond to the needs of businesses and sectors, and support the development of the right tools, information and innovative capacity to address climate risks.

Economy and financial system questions

38. Do you agree with the outcome and objectives in this chapter?

Yes

¹³ Ministry for the Environment. 2020. *National policy statement for freshwater management*. Wellington: Ministry for the Environment.

39. What else should central government do to realise a productive, sustainable and inclusive economy that adapts and builds resilience to a changing climate?

Nothing further at this time.

40. Do you agree with the actions set out in this chapter?

Yes

41. Are there other actions central government should consider to:

- a. support sectors, businesses and regional economies to identify climate risks and adapt?

Yes

Please explain your answer.

Explore successful international technology solutions and apply them to the New Zealand context.

- b. Promote a resilient financial system in the face of climate change?

Yes

Please explain your answer.

Identify opportunities to incentivise investment in green, resilient technologies (that provide alternatives to electricity etc.) and encourage lenders to do the same e.g., solar arrays, batteries, and public EV charging to support communities' resilience.

42. What do you think are the most important actions that will come from outside of central government (e.g., local government, the private sector or other asset owners, iwi, hāpu and/or other Māori groupings such as: business, forestry, fisheries, tourism, urban Māori, the private sector) to reduce the economic and financial risk they face from climate change?

Understanding their opportunities to become more resilient, make change, help others, and find business sustainability and profit in doing so.

43. Are there additional actions within the financial system that would help strengthen Māori climate resilience?

Explore options for borrowing against Māori land specifically for climate resilience and carbon emissions mitigation projects, since Māori landowners have historically been prevented from utilising their shared co-owned land assets (i.e., green bonds).

44. In the context of other risk management options (eg, flood barriers, retreat from high-risk areas), what role should insurance have as a response to flood risk? Please explain your answer.

Insurance should be allowed to respond to the risk, and this will be a crucial tool in educating investors and communities about the need to understand these risks. Action is often not taken until the risk becomes real, so it needs to be allowed to become real, and not artificially hidden by a subsidy/discount.

Whilst our district's towns are all going to be affected by floods in one way or another, it is important that this is considered in decisions now. Our district may also benefit from population increases as people move inland away from coastal risk, so it is essential that those who are coming into our district are not falsely led to believe that there is no flooding inland. Population growth and the consequential building growth needs to be planned carefully in advance. Insurance companies are a key tool to flag any climate risks to newcomers.

45. Should the Government have a role in supporting flood insurance as climate change risks cause private insurance retreat?

As above – this is a crucial tool to support Councils in their ability to communicate the risks of climate hazards, in certain areas.

- a. Does your answer to the above question depend on the circumstances? (For example, who the owner is (eg, low income), the nature and characteristics of the asset (eg, residential or commercial property, contents and vehicles), what other risk management options are available and their cost/benefit, and where the asset is located?). Please explain your answer.

Yes – all asset owners need to be thinking about their risk and acting on it, however the 'Flood Re' (UK) system could apply to our situation – giving landowners 20 – 30 years to make changes, then insurance subsidy ceases.

46. If you think the Government should have a role in supporting flood insurance as climate change risks cause private insurance retreat, how do you envision the Government's role, and how is this best achieved (eg, direct support and/or indirect support such as reducing underlying flood risk)?

As per Q45 a. above.

47. If the Government were to directly support flood insurance:

- a. what is the best way to provide this direct support?

As per Q45 a. above.

- b. should the Government's focus be to support availability or affordability of insurance, or both?

As per Q45 a. - both

- c. how should the costs of that support be funded, and by whom?

Further research needs to go into this.

- d. what are the benefits and downsides of this approach?
A benefit is that it supports those on low fixed incomes, but a downside is that it also allows for freeloading.
- e. should this support be temporary or permanent?
Temporary.
- f. if temporary, what additional measures, if any, do you think would be needed to eventually withdraw this support (eg, undertaking wider flood protection work)?
Further exploration of this policy instrument is required, along with analysis and learning from international implementation.
- g. what would the risks or benefits be of also including non-residential property, such as commercial property?
It should not apply to commercial property – the cost of interventions is going to be high and should be prioritised towards protecting lives and homes. There are other measures in place to support livelihoods.
- h. what design features or complementary policies are needed so any flood insurance intervention retains incentives for sound flood-risk management (eg, discouraging development in high-risk locations)?
No information to contribute.
48. How effective do you think the insurance “price signal” (eg, higher premiums or loss of insurance) is for providing incentives to reduce flood risk?
Highly effective – change happens when financial impact is felt.
49. In your view, should a scheme similar to Flood Re in New Zealand be used to address current and future access and affordability issues for flood insurance? Why or why not?
Yes, we believe this scheme would provide appropriate incentive for action in our flood-prone areas for our ratepayers and would decrease the financial impact and risk for future generations.
50. How do you think a scheme similar to Flood Re in New Zealand could support or hinder climate change adaptation initiatives in New Zealand?
It would likely falsely lead people to believe that adaptation is not required or that the risk from climate impacts is low, however this can be mitigated by clear communication and education about what the scheme is doing and why.

Research strategy

Why we need to take action

Some actions in this plan depend on new or updated data or information. Others need additional knowledge before they can be implemented. Additional data may also be needed to inform the next National Climate Change Risk Assessment (NCCRA), which will be published in 2026. This research strategy describes the data, information and research needed to fill these knowledge gaps.

This research strategy along with the corresponding strategy in the emissions reduction plan will form the climate change component of the Environment and Climate Research Strategy. Together these strategies highlight the research needed to action and guide future funding decisions. This strategy also seeks to address the risks of adaptation being delayed and maladaptation occurring due to knowledge gaps.

Knowledge gaps

The first NCCRA (Ministry for the Environment, 2020) noted an under-investment in adaptation research and capacity. It also highlighted knowledge gaps that, if they remain unfilled, will reduce our ability to assess climate risk and take action to adapt. Areas in which we still need more knowledge and better access to knowledge include:

- a lack of coordinated and readily accessible biological inventories and data sets describing the distribution and status of ecosystems and species
- the relationship between social vulnerabilities, cultural heritage and climate change, and impacts on Māori social, cultural, spiritual and economic wellbeing
- how climate change will affect the banking and insurance sectors, and the flow-on effects on the financial system
- consistent hazard information for assessing the exposure of the built environment at a national scale
- the interdependencies and shared risks between infrastructure sectors
- a coordinated, comprehensive research platform to ensure research is available to inform effective adaptation
- the current and future barriers to adaptation
- the full range of opportunities, and better understanding of those already identified.
- mātauranga Māori, and Māori-centred and Māori-led research.

The Climate Change Adaptation Technical Working Group (2018) also highlighted a critical under-investment in research to support adaptation. Research gaps the Group identified include biophysical and ecological changes, biosecurity, changes in the hydrological cycle influencing fluvial and pluvial flooding, and the implications of climate change on human systems, such as the economy and health.

The Deep South National Science Challenge, in its research strategy (2019–2024), also highlighted the need for additional work on adaptation strategies to manage and reduce risk.¹⁴ It noted some specific gaps:

- climate change implications for drinking water supply and quality
- more detailed analysis of primary industry impacts and implications (including cumulative stressors, biosecurity and climate-related diseases)
- research into the socio-economic implications of flooding
- research into financial risks from climate change, and integration of projections into financial forecasts, including the costs of inaction.

Research themes

Across the actions in this plan, the following themes appear often about the gaps in the knowledge we need to respond to climate change and drive adaptation in Aotearoa New Zealand.

Hazard

Climate impacts and the subsequent hazards provide baseline information for understanding changing environmental conditions and extreme events. The data covers historical datasets, current measurements and projections. Longstanding effort in climate science research has produced a large amount of information, including projections and scenarios for climate impacts and hazards.

Although hazard is the best covered of the three risk components, information gaps remain, including updated projections, scaled to regions of interest. There are also gaps in the information about hazards resulting from climate impacts, for example:

- national flood mapping, sea-level rise zones and wildfire zones
- open access to data, models and scientific information, to suit different audiences – from the technical, scientific community to the general public
- data and information at scales suited to adaptation actions, implementation and solutions. For example, spatial data on flooding and sea-level rise are available at coarse scales suitable for national assessments, but not at finer scales for land-use planning and community engagement.

Exposure

How climate change affects society and the environment is often first understood in terms of who or what is exposed, for example, people, buildings, cultural assets and/or ecosystems. The hazard could be changing environmental conditions such as sea-level rise, or an extreme event such as flood or fire.

Common gaps include understanding exposure from a spatial perspective. This answers questions such as: where does a climate change impact/hazard intersect with a place, thing or person? They may also relate to time – when it will happen and how often – and magnitude – how big and how severe it will be.

¹⁴ Deep South National Science Challenge. 2019. Future Strategy for the Deep South National Science Challenge Phase 2 (2019–2024).

Exposure information requires more than just datasets. Case studies showing actual exposure and response to climate hazards help us understand the present and future. To reduce further vulnerability to the impacts of climate change, studies can also investigate:

- how exposure has changed through time
- how it may change in the future through current and proposed practices, planning and policies.

The status of exposure data and information is mixed. Second to hazard, this component of risk receives research attention and effort, but we need more comprehensive information, and access to it in usable forms. Spatial analysis of exposure to various hazards has been highlighted, at different scales for different subjects.

Vulnerability

Vulnerability comprises *sensitivity* and *adaptive capacity* to exposure to climate hazards. This component of risk is perhaps the most important, and the most challenging, to study and understand. Most of the plan's outcome areas identify knowledge gaps in how exposure to climate change impacts and hazards will play out. This includes people's adaptive capacity and the vulnerability of infrastructure, places and ecosystems to changing environmental conditions and extreme events.

Research deepens our understanding of the effects and implications of climate change. Studies will likely draw on both quantitative and qualitative methods, as well as various frameworks and knowledge systems, including mātauranga Māori.

Risk

Risk arises from the combination of hazard, exposure and vulnerability. Although each component is important, it is vital to understand how hazard, exposure and vulnerability come together to form risk. This will require research that synthesises data and findings from each component. The complete risk assessment will be greater than the sum of its parts. There may be quick wins, but this is likely to also require long-term work programmes.

Research on both the vulnerability component and risk syntheses will enhance adaptive capacity and consider climate change in decisions at all levels. It will provide information about sensitivity, adaptive capacity and risk. This can lead to appropriate responses.

Mātauranga Māori

Iwi/Māori share risks common to all New Zealanders, as well as facing their own unique ones. A Māori perspective will help drive how we understand adaptation and what it means for Māori. It can also advance adaptation and emissions reduction for New Zealand as a whole.

Lack of access to datasets is a key barrier to advancing climate research and action. For Māori and iwi groups, it is a barrier to adaptation action. There is also a need to translate scientific knowledge into meaningful information that the community can use. For Māori, bolstering their capacity and capability in the environmental field will strengthen their response to climate risks and vulnerabilities.

Other gaps include research on:

- socio-cultural and socio-economic links between climate change impacts, vulnerabilities and potential impacts for iwi/Māori

- indigenous flora and fauna unique to New Zealand
- the broader ecological system and Māori communities
- fisheries, forestry, health, housing, business and all other key areas across society.

These require more Māori-centred and Māori-led research, to design adaptation solutions.

Accessibility

Access to data, information and research findings is important for adaptation planning, response and action.

Exposure data are nationally significant, requiring open access to databases across scales, ideally with national coverage.

Other accessible information is needed through:

- open-access datasets
- a research platform, as the NCCRA notes
- research results. With visible results, we can build knowledge and act on it. This can include the climate impacts and adaptation research from the last two to three decades.

Research priorities

Across the research themes, the following are areas to prioritise to 2028.

- Collate and complete **priority data** (hazards, exposure).
- Provide **open access data**, accessible to a variety of audiences.
- Design, implement and share research platforms.
- **Transform data into knowledge about vulnerability:** Monitor and evaluate sensitivity and adaptive capacity. This addresses the call to understand vulnerability and, in some cases, generic use of the word 'risk'. Studies such as monitoring and scenario modelling are needed, including in the following specific areas.
 - **Ecosystems.** Monitoring ecosystems helps us understand their state and their changes through time. This makes it possible to understand vulnerability. Integrated monitoring and research highlights current ecosystem functioning as it alters in response to changing conditions and extreme events. It also facilitates invasive/biosecurity monitoring, which is another climate impact. At a higher level, a national monitoring system will help with environmental reporting and resource management.
 - **Community vulnerability** to changing conditions and extreme events. Studies of the events and their aftermath can include the response to and recovery from exposure to hazards, the immediate effects and long-term follow-up. This includes both sensitivity (how communities are affected) and adaptive capacity (how they respond) through the entire cycle. Frameworks include the National Emergency Management Agency's '4 Rs': reduction, readiness, response, recovery.
- Support **mātauranga Māori and kaupapa Māori research.** A number of proposed actions will progress the development of iwi/Māori climate data and information. These include actions that focus on mātauranga Māori environmental indicators, iwi/Māori socio-

economic risk and vulnerability assessment, mapping of taonga, and the extension of mapping the cultural footprint against high-impact weather.

- **Monitor and evaluate the effects** of policy and interventions. This includes ecological restoration, environmental design, effects of adaptation actions in communities, and the adaptive capacity of the built environment and infrastructure.

Implementation timeframes

Short term (2022–2025)

The first three years of this plan are key for both getting the data and information and starting long-term programmes. This will allow data and information to be made available to the second NCCRA, which will be published in 2026.

During this period, research priorities are to: consolidate existing data and make them open access; complete priority datasets; start national networks of long-term monitoring of natural environments; and start and complete vulnerability studies.

Existing and concurrent research should aim to produce and publish results in 2024–25.

National Science Challenges

The National Science Challenges conclude in 2024. The projects with climate adaptation research are: The Deep South, Resilience to Nature’s Challenges, Our Land and Water, New Zealand’s Biological Heritage, Sustainable Seas, and Building Better Homes, Towns and Cities.

The results will likely be ready in time to inform the second NCCRA and ongoing national adaptation plan work.

Medium term (2025–28)

The second national adaptation plan will be published at the end of this period. Research priorities include: completing nationally prioritised datasets; setting up the national ecological monitoring network; continuing and beginning research programmes; and publishing research results, especially vulnerability studies and risk syntheses.

Long term (2028 onward)

Research in all areas will build on what has been learned, and address what remains to be known, as knowledge about climate change grows. This requires commitment to long-term research, including national environmental monitoring and ecosystem studies.

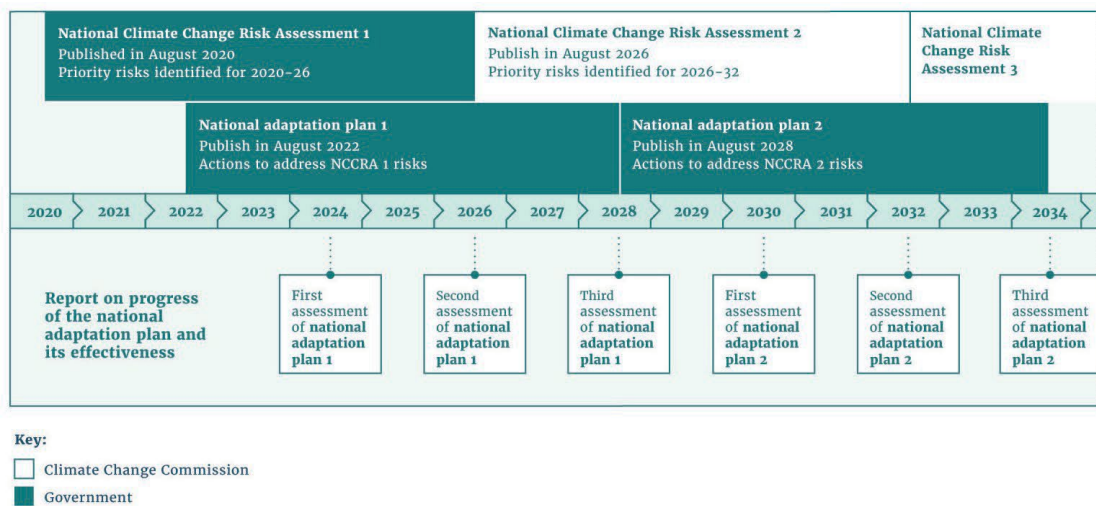
Other actions during this period include: regularly updating maps and information on hazards and exposure; collating research findings in vulnerability assessments and risk syntheses; and monitoring and evaluating restoration and adaptation.

Monitoring and reporting

Reporting on this plan

Every two years, He Pou a Rangi – Climate Change Commission will provide the Minister of Climate Change with a report on the implementation and effectiveness of the national adaptation plan (figure 8). The Minister must respond to the Commission’s reports within six months of receiving them. This provides an opportunity for the Government to adjust the actions and manage changing uncertainty and risk. It also has international commitments to report on New Zealand’s progress towards building resilience.

Figure 8: The monitoring, evaluating and reporting process for adaptation action



Governance and oversight

Successfully implementing the national adaptation plan will require action across government. Strong governance and accountability mechanisms are needed to make continuous progress. An Interdepartmental Executive Board is being established to oversee the emissions reduction plan and national adaptation plan. The Board will monitor and report on overall progress. The Climate Change Response Ministers Group will oversee the plan and drive progress.

Measures and indicators for assessing progress

Each critical and supporting action in this national adaptation plan includes a progress indicator. This defines the progress expected by 2024. Additional indicators to 2028 will be included in the final national adaptation plan.

To help the Commission to fulfil its function of assessing the effectiveness of this plan in reducing risk, the Ministry for the Environment will regularly assess the adaptation preparedness of certain organisations. These organisations include policy development and service delivery agencies. The results from the first survey undertaken in 2020 set a baseline against which the effectiveness of future actions can be assessed.

Closing general question

51. Do you have any other thoughts about the draft national adaptation plan that you would like to share?

We support the work that has been undertaken to produce such a comprehensive plan and anticipate that policy instruments will be adapted and developed in response to our feedback.

Appendix 1: Glossary

Glossary of terms

Key term	Definition
Adaptation	In human systems, the process of adjusting to actual or expected climate and its effects, in order to moderate harm or take advantage of beneficial opportunities. In natural systems, the process of adjusting to actual climate and its effects. Human intervention may help these systems to adjust to expected climate and its effects.
Adaptation options	The wide range of strategies and measures that are available and appropriate for addressing adaptation. They can take the form of structural, institutional, ecological or behavioural actions.
Adaptive capacity	The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences.
Asset	Something of value, which may be exposed or vulnerable to a hazard or risk. It may be something physical, environmental, cultural or financial/economic, and its value may be tangible, intrinsic or spiritual (see Taonga).
Baseline	An initial set of critical observations or data used for comparison or a control.
Biodiversity	The variability among all living organisms on Earth. It includes diversity within species, diversity between species and diversity of an ecosystem. The living organisms may be from any sources, such as terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.
Capacity building	The practice of supporting an individual, community, society or organisation to respond to change by enhancing their strengths and attributes, and improving the resources available to them.
Cascading impacts	A series of events where an initial impact produces further impacts that are significantly larger than the first one. In relation to extreme weather events, an extreme hazard causes a sequence of secondary events in natural and human systems that result in major physical, natural, social and/or economic disruption. Cascading impacts are complex and multidimensional, and are associated more with the extent to which the natural and human systems are vulnerable than with the size of the original hazard.
Climate	Informally, the average weather over a period ranging from months to thousands or millions of years. In more formal terms, a statistical description of the mean and variability of quantities, usually of surface variables such as temperature, precipitation and wind, averaged over a period (typically 30 years, as defined by the World Meteorological Organization). More broadly, climate is the state, including a statistical description, of the climate system.
Climate change	A change in the state of the climate that can be identified (eg, by using statistical tests) by changes or trends in the mean and/or the variability of its properties, and that persists for an extended period, typically decades to centuries. Includes natural internal climate processes and external climate forcings such as variations in solar cycles, volcanic eruptions and persistent

Key term	Definition
	anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2014a). The United Nations Framework Convention on Climate Change (UNFCCC) definition of climate change specifically links it to direct or indirect human causes, as: ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods’. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes.
Climate resilience	The ability to anticipate, prepare for and respond to the impacts of a changing climate, including the impacts that we can anticipate and the impacts of extreme events. It involves planning now for sea-level rise and more frequent flooding. It is also about being ready to respond to extreme events like forest fires or extreme floods, and to trends in precipitation and temperature that emerge over time like droughts.
Co-benefit	A positive effect that a policy or measure aimed at one objective has on another objective, thereby increasing the total benefit to society or the environment.
Coastal	Describes either the land near to the sea (eg, ‘coastal communities’) or the part of the marine environment that is strongly influenced by land-based processes (eg, ‘coastal seas’, meaning the part of the sea that is generally shallow and near-shore). The landward and seaward limits of the coastal zone are not consistently defined, neither scientifically nor legally. Thus, coastal waters can either be considered as equivalent to territorial waters (extending 12 nautical miles / 22.2 km from mean low water), or to the full Exclusive Economic Zone, or to shelf seas, with less than 200 m water depth.
Coastal erosion	Coastal erosion, sometimes referred to as shoreline retreat, occurs when a net loss of sediment or bedrock from the shoreline results in landward movement of the high-tide mark. The process when the high-tide mark moves closer towards the land due to a net loss of sediment or bedrock from the shoreline. Also known as shoreline retreat.
Consequence	The outcome of an event that may result from a hazard. It can be expressed quantitatively (eg, units of damage or loss, disruption period, monetary value of impacts or environmental effect), by category (eg, high, medium, low level of impact) or qualitatively (a description of the impacts). Alternatively, the outcome of an event that affects objectives.
(the) Crown	Generally, executive government conducted by Ministers and their departments. The Crown does not normally include organisations with their own corporate identities, such as state-owned enterprises.
Cultural asset	Material artefacts, non-material items and natural places that have cultural value.
Cultural heritage	Cultural heritage means those aspects of the environment that contribute to an understanding and appreciation of New Zealand’s history and cultures. It includes historic sites, structures, places, and areas, archaeological sites, sites of significance to Māori, including wāhi tapu, and cultural landscapes.
Disaster	A serious disruption of the functioning of a community or a society at any scale that occurs because hazardous events interact with conditions of exposure, vulnerability and capacity, leading to human, material, economic and/or environmental losses and impacts.

Key term	Definition
Disaster risk management	Processes for designing, implementing and evaluating strategies, policies and measures to improve understanding of current and future disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, prevention and protection, response and recovery practices. The aim is to increase human security, wellbeing, quality of life, and sustainable development.
Displacement	The involuntary movement, individually or collectively, of people from their country or community, notably for reasons of armed conflict, civil unrest, or natural or man-made disasters. In the context of this plan, displacement primarily refers to the involuntary movement of individuals or communities in response to climate change impacts.
Distributional impact	The effects of environmental policies (for example, higher transport or energy costs) across households, iwi/Māori, businesses, communities and regions. Some groups may pay more, or receive fewer benefits from the policies
Drought	An exceptionally long period of water shortage for existing ecosystems and the human population (due to low rainfall, high temperature and/or wind).
Dry year	An extended period when the energy supply in Aotearoa relies more on natural gas and coal because hydro-electric generation is reduced. This occurs because hydro lakes only hold enough water for a few weeks of winter energy demand if inflows (rain and snow melt) are very low.
Dynamic adaptive pathways planning	A framework that supports climate adaptation decision making by developing a series of actions over time (pathways). It is based on the idea of making decisions as conditions change, before severe damage occurs, and as existing policies and decisions prove no longer fit for purpose.
Ecosystem	A functional unit consisting of living organisms, their non-living environment and the interactions within and between them. The purpose of the ecosystem defines what components belong to it and where its spatial boundaries lie. Ecosystem boundaries can change over time. Ecosystems are nested within other ecosystems and their scale can range from very small to the entire biosphere. In the current era, most ecosystems either contain people as key organisms or are influenced by the effects of human activities in their environment.
Ecosystem health	A metaphor that describes the condition of an ecosystem, by analogy with human health. The health status of an ecosystem is based not on a standard measurement but on a judgement of its resilience to change, which varies depending on which measures are used and which social aspirations are behind the assessment.
Ecological corridor	An area of habitat connecting wildlife populations that have been separated by human activities or structures.
Ecological integrity	The ability of an ecological system to support and maintain a community of organisms where the composition, diversity and functional organisation of its species is comparable to those of natural habitats within a region.
Emergency management	The process of applying knowledge, measures and practices that are necessary or desirable for the safety of the public or property, and are designed to guard against, prevent, reduce, recover from or overcome any hazard, harm or loss associated with any emergency. Activities include planning, organising, coordinating and implementing those measures, knowledge and practices.

Key term	Definition
Emissions	In the context of climate change, emissions of greenhouse gases, precursors of greenhouse gases and aerosols caused by human activities. These activities include the burning of fossil fuels, deforestation, land use and land-use changes, livestock production, fertilisation, waste management and industrial processes.
Erosion	The process in which actions of water, wind or ice wear away land.
Equity	The principle of being fair and impartial, often also aligned with ideas of equality and justice. It provides a basis for understanding how the impacts of and responses to climate change, including costs and benefits, are distributed in and by society in more or less equal ways. The principle can be applied in understanding who is responsible for climate impacts and policies, how those impacts and policies are distributed across society, generations and gender, and who participates and controls the processes of decision making.
Exposure	Being present in a place or setting that could be adversely affected. Those that could be harmed in that environment include people; livelihoods; species or ecosystems; environmental functions, services and resources; infrastructure; or economic, social or cultural assets.
Extreme weather event	<p>An event that is rare at a particular place and time of year. What is 'extreme weather' may vary from place to place in an absolute sense. The measure of what is 'rare' may also vary but it involves the occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. In general, an extreme weather event would be as rare as or rarer than the 10th or 90th percentile of a probability density function estimated from observations.</p> <p>When a pattern of extreme weather persists for some time, such as a season, it may be classified as an extreme climate event, especially if it yields an average or total that is itself extreme (eg, high temperature, drought or heavy rainfall over a season).</p>
Flood	An event where the normal boundaries of a stream or other water body overflow, or water builds up over areas that are not normally underwater. Floods can be caused by unusually heavy rain, for example during storms and cyclones. Floods include river (fluvial) floods, flash floods, urban floods, rain (pluvial) floods, sewer floods, coastal floods and glacial lake outburst floods.
Fiscal impacts	The fiscal impact of a policy or event refers to the implications it has for government expenditure or revenue.
Food security	A situation where all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, access, utilisation and stability. The nutritional dimension is integral to the concept of food security.
Frequency (of a hazard)	The number or rate of occurrences of hazards, usually over a particular period.
Governance	<p>The governing architecture and processes of interaction and decision making that exist in and between governments, economic and social institutions.</p> <p>Governance permeates all aspects of New Zealand, from Te Tiriti partnership between Māori and the Crown to the relationship between local government and communities, and from the economy to the built environment to natural ecosystems.</p>

Key term	Definition
Greenhouse gas (GHG)	<p>Gas in the atmosphere, which may have natural or human causes, that absorbs and emits radiation at specific wavelengths within the spectrum of radiation emitted by the Earth’s ocean and land surface, by the atmosphere itself and by clouds. This property causes the greenhouse effect.</p> <p>The main greenhouse gases in Earth’s atmosphere are water vapour, carbon dioxide, nitrous oxide, methane and ozone. Human-made GHGs include sulphur hexafluoride, hydrofluorocarbons, chlorofluorocarbons and perfluorocarbons.</p>
Gross domestic product (GDP)	<p>The sum of the gross value that all resident and non-resident producers in the economy added, at purchasers’ prices, to a country or region plus any taxes and minus any subsidies not included in the value of the products in a country or a geographic region for a given period, normally one year. GDP is calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources.</p>
Hazard	<p>The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.</p>
Heatwave	<p>A period of abnormally hot weather often defined with reference to a relative temperature threshold, lasting from two days to months.</p>
Inter-governmental Panel on Climate Change (IPCC)	<p>The United Nations body for assessing the science related to climate change. The IPCC is organised into three working groups and a task force:</p> <ul style="list-style-type: none"> • Working Group I (WGI) – physical science basis • Working Group II (WGII) – impacts, adaptation and vulnerability • Working Group III (WGIII) – mitigation • Task Force on national greenhouse gas inventories.
Impacts	<p>The consequences of realised risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather events), exposure and vulnerability. They are generally effects on human lives, livelihoods, health and wellbeing; ecosystems and species; economic, social and cultural assets; services (including ecosystem services); and infrastructure. They can be harmful or beneficial. Also known as consequences or outcomes.</p>
Indigenous knowledge	<p>The understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. For many indigenous peoples, indigenous knowledge informs decision making about fundamental aspects of life, from day-to-day activities to longer-term actions. This knowledge is integral to cultural complexes, which also include language, systems of classification, resource use practices, social interactions, values, ritual and spirituality. These distinctive ways of knowing are important facets of the world’s cultural diversity.</p>
Infrastructure	<p>The designed and built set of physical systems, along with their institutional arrangements, that interact with the broader environment to provide services to people and communities that support economic growth, health, quality of life and safety.</p>
Insurance/reinsurance	<p>A group of financial instruments for sharing and transferring risk among a pool of at-risk households, businesses and/or governments.</p>

Key term	Definition
Land use	<p>All of the arrangements, activities and inputs (a set of human actions) that people undertake in a certain type of land cover (eg, forest land, cropland, grassland, wetland or settlements).</p> <p>Alternatively, the social and economic purposes for which land is managed (eg, grazing, timber extraction, conservation and city dwelling).</p>
Maladaptation	<p>Actions that may lead to increased risk of adverse climate-related outcomes, including increased greenhouse gas emissions, increased vulnerability to climate change or reduced welfare, now or in the future. Maladaptation is usually an unintended consequence.</p>
Managed retreat	<p>The purposeful, coordinated movement of people and assets (eg, buildings, infrastructure) away from risks. This may involve the movement of a person, infrastructure (eg, building or road), or community. It can occur in response to a variety of hazards such as flood, wildfire, or drought.</p>
Māori values and principles	<p>Values and principles that come from Māori views of the world and that Māori use to make sense of, experience and interpret the world. They form the basis for Māori ethics and principles.</p>
Mitigation	<p>In the context of climate change, a human intervention to reduce the sources or enhance the sinks of greenhouse gases.</p>
Nature-based solutions	<p>Solutions that are inspired and supported by nature and are cost-effective, and at the same time provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features (ie, vegetation and water features) and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. For example, using vegetation (eg, street trees or green roofs) or water elements (eg, rivers or water treatment facilities) can help reducing heat in urban areas or support stormwater and flood management.</p>
Pathway	<p>The evolution of natural and/or human systems over time towards a future state. Pathway concepts range from sets of quantitative and qualitative scenarios or narratives of potential futures to solution-oriented decision-making processes to achieve desirable social goals. Pathway approaches typically focus on biophysical, techno-economic and/or socio-behavioural changes and involve various dynamics, goals and actors across different scales.</p>
Place/Places	<p>Urban or rural areas, ranging from neighbourhoods to towns and regions. Adaptation must address both the physical elements of a place (eg, homes, buildings, infrastructure and spaces around them) and the social elements (eg, the identity of people and communities, cultural value).</p>
Ocean acidification	<p>A reduction in the pH of the ocean, accompanied by other chemical changes (primarily in the levels of carbonate and bicarbonate ions), over an extended period, typically decades or longer, which is caused primarily by uptake of carbon dioxide (CO₂) from the atmosphere, but can also be caused by other chemical additions or subtractions from the ocean. Anthropogenic Ocean Acidification refers to the component of pH reduction that is caused by human activity (IPCC, 2011, p. 37). A process in which the pH of the ocean reduces (becomes more acidic) and other chemical changes occur (mainly in the levels of carbonate and bicarbonate ions) over several decades or longer. The main cause is uptake of carbon dioxide from the atmosphere, but other chemical additions or subtractions from the ocean can contribute.</p>

Key term	Definition
	Anthropogenic ocean acidification is the component of pH reduction that is caused by human activity.
Oranga Marae	<p>Oranga Marae is a programme of support, advice and investment for marae. It gives whānau and hapū advice and support to help develop their marae and achieve their goals. This support may include building projects and activities to revitalise cultural knowledge. A key goal of the programme is to strengthen the ability of marae to pass on their ancestral knowledge of whaikōrero, karanga and local mātauranga, tikanga and kawa to descendants. A programme of support, advice and investment for marae. It gives whānau and hapū advice and support to help develop their marae and achieve their goals. This support may include building projects and activities to revitalise cultural knowledge.</p> <p>A key goal of the programme is to strengthen the ability of marae to pass on their ancestral knowledge of whaikōrero, karanga and local mātauranga, tikanga and kawa to descendants.</p>
Regenerative agriculture	An approach to land management that recognises how all aspects of agriculture are connected through a network. This differs from a linear view of agriculture as a supply chain. The principles behind regenerative agriculture are meant to restore soil and ecosystem healthy, address inequality and leave our land, waters and climate in better shape for future generations.
Resilience/resilient	The capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, by responding or reorganising in ways that maintain their essential function, identity and structure. Resilience is a positive attribute when it allows systems to maintain their capacity to adapt, learn and/or transform.
Retrofitting	The process of adding new technology or features to older systems, especially industrial installations or buildings.
Risk	The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change. Adverse consequences may affect human lives, livelihoods, health and wellbeing; economic, social and cultural assets and investments; infrastructure; services (including ecosystem services); and ecosystems and species.
Risk assessment	The scientific estimation of risks, which may be either quantitative or qualitative.
Risk management	The process of making plans, actions, strategies or policies to reduce the likelihood and/or scale of potential adverse consequences, based on assessed or perceived risks.
Sea-level rise	<p>Change to the height of sea level over time, which may occur globally or locally. Causes may be:</p> <ul style="list-style-type: none"> • a change in ocean volume as a result of a change in the mass of water in the ocean (eg, due to melt of glaciers and ice sheets) • changes in ocean volume as a result of changes in ocean water density (eg, expansion under warmer conditions) • changes in the shape of the ocean basins and changes in Earth’s gravitational and rotational fields • local subsidence or uplift of the land.

Key term	Definition
Storm surge	The temporary increase, at a particular location, in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/or strong winds). It is the excess in height above the level expected from the tidal variation alone at that time and place.
Stressor	In the context of climate change, an event or trend, often not climate-related, that has an important effect on the system exposed and can increase vulnerability to climate-related risk.
Sustainable/ sustainability	Describes conditions where natural and human systems can persist. Ecosystems continuously function, biodiversity is high, natural resources are recycled and, in the human sector, people successfully apply justice and equity.
Three waters	Drinking water, wastewater and stormwater.
Tipping point	A critical threshold beyond which a system reorganises, often abruptly and/or irreversibly.
Uncertainty	A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may occur for many reasons. For example, the data may be imprecise, definitions of concepts or terminology may be ambiguous, understanding of critical processes may be incomplete or projections of human behaviour are in doubt.
Urban heat islands	Heat islands are urbanized areas that experience higher temperatures than outlying areas. Structures such as buildings, roads, and other infrastructure absorb and re-emit the sun's heat more than natural landscapes such as forests and water bodies. Urban areas, where these structures are highly concentrated and greenery is limited, become "islands" of higher temperatures relative to outlying areas.
Vulnerability/ vulnerable	Being predisposed or more likely to be adversely affected. Elements that contribute to this concept include sensitivity or susceptibility to harm and lack of capacity to cope and adapt.
Wellbeing	The health, happiness and prosperity of an individual or group. It can cover material wellbeing (eg, income and wealth, jobs and earnings, and housing), health (eg, health status and work-life balance), security (eg, personal security and environmental quality), social relations (eg, social connection, subjective wellbeing, cultural identity and education) and freedom of choice and action (eg, civic engagement and governance).
Whānau Ora	Whānau Ora puts whānau and families in control of the services they need to work together, build on their strengths and achieve their aspirations.
Wilding conifers	Introduced conifers that are spreading across the landscape through natural regeneration. Also known as wilding pines.
Zoonotic disease	A disease that can be naturally transferable from vertebrate animals to humans.

List of acronyms and abbreviations

Acronym	Full name
AHL	Animal Health Laboratory
ANZBS	Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy
CCAAP	Climate Change Adaptation Action Plan
CERF	Climate Emergency Response Fund
DIA	Department of Internal Affairs
DOC	Department of Conservation
EQC	Earthquake Commission
FMA	Financial Markets Authority
FNZ	Fisheries New Zealand
GDP	Gross domestic product
HNAP	Health National Adaptation Plan
HUD	Te Tūapapa Kura Kāinga - Ministry of Housing and Urban Development
IPCC	Inter-governmental Panel on Climate Change
IVL	International Visitor Conservation and Tourism Levy
LIM	Land Information Memorandum
MBIE	Ministry of Business, Innovation and Employment
MCH	Ministry for Culture and Heritage
MFAT	Ministry of Foreign Affairs and Trade
MfE	Ministry for the Environment
MOD	Ministry of Defence
MOE	Ministry of Education
MOH	Ministry of Health
MOT	Te Manatū Waka Ministry of Transport
MPI	Ministry for Primary Industries
MSD	Ministry of Social Development
NCCRA	National Climate Change Risk Assessment
NEMA	National Emergency Management Agency
NIWA	National Institute of Water and Atmospheric Research
NPS IB	National Policy Statement on Indigenous Biodiversity
RBNZ	Reserve Bank of New Zealand
PHEL	Plant Health Environment Laboratory
TPK	Te Puni Kōkiri – Ministry of Māori Development
UNFCCC	United Nations Framework Convention on Climate Change
XRB	External Relations Board

Te reo Māori glossary

Te reo Māori	English
Ara whakamua	The path forward.
Hapū	Kinship group, clan, subtribe.
Hapori	Community, section of a kinship group, family, society.
Iwi	Tribe, large group descended from a common ancestor.
Kaitiaki or kaitiakitanga	Guardian or guardianship, stewardship, for example, of natural resources.
Kaupapa Māori	Māori approach, topic, customary practice, institution, agenda, principles, ideology – a philosophical doctrine, incorporating the knowledge, skills, attitudes and values of Māori society.
Kāwanatanga	Government, dominion, rule, authority, governorship, province.
Kawa	Ceremony, protocol.
Mahinga kai	Places where traditional food and other natural resources are obtained.
Mana whenua	Power from/authority over land or territory.
Marae	Courtyard - the open area in front of the wharenuī, where formal greetings and discussions take place. Often also used to include the complex of buildings around the marae.
Marau-ā-kura	Ministry of Education term referring to a living, breathing curriculum. Marau ā-kura reflects the expectations and aspirations of the whānau, hapū, and iwi.
Mātauranga (Māori)	Māori knowledge systems and worldviews, including traditional concepts.
Mātauranga-a-iwi	Knowledge with an iwi-specific base.
Mauri	Life principle, life force, vital essence, special nature, a material symbol of a life principle, source of emotions - the essential quality and vitality of a being or entity. Also used for a physical object, individual, ecosystem or social group in which this essence is located.
Papatūānuku	Earth, Earth Mother and wife of Ranginui – all living things originate from them in Māori mythology.
Pou	Support, supporter, stalwart, mentor, symbol of support, metaphoric post – someone, a group, tribe, gathering or something that strongly supports a cause or is a territorial symbol, such as a mountain or landmark, representing that support.
Rangatiratanga	Chieftainship, right to exercise authority, chiefly authority, ownership, leadership of a social group
Rongoā crops	Medicinal plants.
Tangata whenua	The people of the land, local indigenous people. Māori are tangata whenua of the land in which they whakapapa back to.
Taonga/Taonga Māori	Treasure, anything prized – applied to anything considered to be of value, including socially or culturally valuable objects, resources, phenomena, ideas and techniques.
Te ao Māori	The Māori world.

Te reo Māori	English
Te Tiriti	The Treaty of Waitangi. Note: While these terms are used interchangeably, the national adaptation plan acknowledges that the English version and te reo Māori translation are separate documents and differ in a number of respects.
Tikanga	Custom, practice, correct protocol; the customary system of values and practices that have developed over time and are deeply embedded in the social context.
Tino rangatiratanga	Self-determination, sovereignty, autonomy, self-government, domination, rule, control, power.
Urupā	Burial ground.
Wāhi tapu	Sacred site – a place subject to long-term ritual restrictions on access or use, for example, a burial ground, a battle site or a place where tapu objects were placed.
Whānau	Family, extended family, family connection.
Whenua (Māori)	Māori land. There are three types of whenua Māori. Māori freehold land, Māori customary land, general land owned by Māori.

Appendix 2: Climate risks this first plan addresses

* The risk has disproportionate impacts on Māori.

† The risk is of particular significance to Māori.

10 most significant risks

Natural (N)	Human (H)	Economy (E)	Built (B)	Governance (G)
N1 Risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea level rise and extreme weather events.	H1 Risks to social cohesion and community wellbeing from displacement of individuals, families and communities due to climate change impacts. *	E1 Risks to governments from economic costs associated with lost productivity, disaster relief expenditure and unfunded contingent liabilities due to extreme events and ongoing, gradual changes.	B1 Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea level rise. *	G1 Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.
N2 Risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.	H2 Risks of exacerbating existing inequities and creating new and additional inequities due to differential distribution of climate change impacts. *	E2 Risks to the financial system from instability due to extreme weather events and ongoing, gradual changes.	B2 Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea level rise. *	G2 Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation.
N3 Risks to riverine ecosystems and species from alterations in the volume and variability of water flow, increased water temperatures, and more dynamic morphology (erosion and deposition) due to changes in rainfall and temperature.	H3 Risks to physical health from exposure to storm events, heatwaves, vector-borne and zoonotic diseases, water availability and resource quality and accessibility due to changes in temperature, rainfall and extreme weather events.	E3 Risks to land-based primary sector productivity and output due to changes in mean rainfall and temperature, seasonality, weather extremes and changes in the distribution of invasive species.	B3 Risks to landfills and contaminated sites due to extreme weather events and ongoing sea level rise.	G3 Risks to governments and businesses from climate change related litigation, due to inadequate or mistimed climate change adaptation.

Natural (N)	Human (H)	Economy (E)	Built (B)	Governance (G)
N4 Risks to wetland ecosystems and species, particularly in eastern and northern parts of New Zealand, from reduced moisture status due to reduced rainfall.	H4 Risks of conflict, disruption and loss of trust in government from changing patterns in the value of assets and competition for access to scarce resources primarily due to extreme weather events and ongoing sea level rise. ★	E4 Risks to tourism from changes to landscapes and ecosystems and impacts on lifeline infrastructure, due to extreme weather events and ongoing, gradual changes.	B4 Risk to wastewater and stormwater systems (and levels of service) due to extreme weather events and ongoing sea level rise. ★	G4 Risk of a breach of Treaty obligations from a failure to engage adequately with and protect current and future generations of Māori from the impacts of climate change. ★
N5 Risks to migratory and/or coastal and river-bed nesting birds due to reduced ocean productivity, ongoing sea level rise and altered river flows.	H5 Risks to Māori social, cultural, spiritual and economic wellbeing from loss and degradation of lands and waters, as well as cultural assets such as marae, due to ongoing sea level rise, changes in rainfall and drought. ★	E5 Risks to fisheries from changes in the characteristics, productivity, and spatial distribution of fish stocks due to changes in ocean temperature and acidification.	B5 Risks to ports and associated infrastructure due to extreme weather events and ongoing sea level rise.	G5 Risks of delayed adaptation and maladaptation due to knowledge gaps resulting from under-investment in climate adaptation research and capacity building.
N6 Risks to lake ecosystems due to changes in temperature, lake water residence time, and thermal stratification and mixing.	H6 Risks to Māori social, cultural, spiritual and economic wellbeing from loss of species and biodiversity due to greater climate variability and ongoing sea level rise. ★	E6 Risks to the insurability of assets due to ongoing sea level rise and extreme weather events.	B6 Risks to linear transport networks due to changes in temperature, extreme weather events and ongoing sea level rise. ★	G6 Risks to the ability of the emergency management system to respond to an increasing frequency and scale of compounding and cascading climate change impacts in New Zealand and the Pacific region. ★
N7 Risks to terrestrial, freshwater and marine ecosystems due to increased extreme weather events, drought, and fire weather.	H7 Risks to mental health, identity, autonomy and sense of belonging and wellbeing from trauma due to ongoing sea level rise, extreme weather events and drought. ★	E7 Risks to businesses and public organisations from supply chain and distribution network disruptions due to extreme weather events and ongoing, gradual changes.	B7 Risk to airports due to changes in temperature, wind, extreme weather events and ongoing sea level rise.	G7 Risk that effective climate change adaptation policy will not be implemented and sustained due to a failure to secure sufficient parliamentary agreement.

Natural (N)	Human (H)	Economy (E)	Built (B)	Governance (G)
N8 Risks to oceanic ecosystem productivity and functioning due to changes in sea surface temperature, ocean mixing, nutrient availability, chemical composition and vertical particle flux.	H8 Risks to Māori and European cultural heritage sites due to ongoing sea level rise, extreme weather events and increasing fire weather. ★		B8 Risks to electricity infrastructure due to changes in temperature, rainfall, snow, extreme weather events, wind and increased fire weather.	G8 Risk to the ability of democratic institutions to follow due democratic decision-making processes under pressure from an increasing frequency and scale of compounding and cascading climate change impacts. ★
N9 Risks to sub-alpine ecosystems due to changes in temperature and a reduction in snow cover.			B9 Risks to telecommunications infrastructure (risk in addition to those identified in the National Climate Change Risk Assessment)	
N10 Risks to carbonate-based, hard-shelled species from ocean acidification due to increased atmospheric concentrations of CO ₂ .				
N11 Risks to the long-term composition and stability of indigenous forest ecosystems due to changes in temperature, rainfall, wind and drought.				

Source: National Climate Change Risk Assessment

Appendix 3: Action details

Status:

c: current; for example, has funding, mandate and scope is clear

p: proposed; for example, not yet funded, scope not yet agreed or decisions not yet made

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
SW1	Reform the resource management system	MfE	Environment	G1, G2, G3, G4, G8, B3, E1, E6, N1, N2, N3, N7	c	Year 1 (2022/23)	In 2023 we expect the National and Built Environments Act and the Strategic Planning Act to be passed.
SW1	Pass legislation to support managed retreat	MfE	Climate Change	E1, E6, G1, G2, G8, B3	c	Years 1 – 3 (2022–25)	The Government is expecting to introduce the Climate Adaptation Bill by the end of 2023, setting out the managed retreat framework.
SW1	Reform institutional arrangements for water services	DIA	Local Government		c	Years 1–2 (2022–24)	By July 2024, water services entities are established.
SW1	Modernise the emergency management system	NEMA	Emergency Management	G6	c	Years 1–6 (2022–28)	By August 2024, there will be adoption of new EM legislation and improved guidance provided across the emergency management system.
SW1	The future for Local Government Review	DIA	Local Government	E1, G2	c	Year 1 (2022/23)	In April 2023, the Local Government Review Panel will provide the Minister with recommendations for improving the local governance system. Following this, the Government will decide how to respond to the Review’s recommendations.
SW1	Establish a foundation to work with Māori on climate actions	MfE	Climate Change	G4	c	Years 1–2 (2022–24)	TBC – to align with the emissions reduction plan

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
SW1	Set national direction on natural hazard risk management and climate adaptation through the National Planning Framework	MfE	Environment	TBC	c	Years 1–6 (2022–28)	Cabinet gives approval for national direction roadmap and implementation is underway.
SW1	Implement the National Disaster Resilience Strategy (NDRS)	NEMA	Emergency Management	G2, G6	c	Years 1–6 (2022–28)	Cabinet gives approval for NDRS Roadmap and implementation underway
SW1	Develop the emergency management workforce	NEMA	Emergency Management	G6	c	Years 1–6 (2022–28)	Implementation and integration of a professional training framework for disaster response and recovery at the national and regional level. This includes recognition of the contribution and development of the Māori emergency management workforce.
SW1	Establish central government oversight and coordination for implementing the national adaptation plan	MfE	Climate Change	E1, G2, G3, G7	c	Years 1–6 (2022–28)	Complete specific yearly reporting requirements by agencies.
SW2	Provide access to the latest climate projections data	MBIE	Building and Construction	G1, G3, G6	c	Years 1–2 (2022–24)	By June 2024, national climate projection datasets for New Zealand are made available and deliver a product that enables end-users to appropriately measure climate change risk.
SW2	Design and develop an Adaptation Information Portal	MfE	Climate Change	G1, G2, G3, G4, G5, G6	c	Years 1–6 (2022–28)	By the end of 2023, a design scope and delivery plan will be complete and user needs defined.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
SW3	Deliver a rolling programme of targeted guidance	MfE	Climate Change				
SW3	Promote the use of the New Zealand Climate Change Projections guidance	MfE	Climate Change	G1	c	Year 1 (2022/23)	Guidance completed by August 2022. By 2024, document has been or is soon to be taken out of commission due to work on latest IPCC projections.
SW3	Produce adaptation guidance for central government policy makers	MfE	Climate Change	G1, G3	c	Year 1 (2022/23)	The guidance will be published in 2022.
SW3	Produce guidance for dynamic adaptive pathways planning (DAPP)	MfE	Climate Change	G1, G2, G3	c	Years 1–2 (2022–24)	Publish a delivery plan for this guidance by September 2022.
SW3	Produce guidance on using different socio-economic scenarios for adaptation planning	MfE	Climate Change	G1, G3	c	Years 1–2 (2022–24)	Publish a delivery plan for this guidance by September 2022.
SW3	Regularly update adaptation guidance for local government	MfE	Climate Change	G1, G3, G8	c	Year 1 (2022/23) and year 3 (2024/25)	Publish a prioritised delivery plan by September 2022 setting out when each piece of guidance will be updated.
SW3	Produce guidance on integrating mātauranga Māori into adaptive planning and working with mana whenua	MfE	Climate Change	G4	p	Years 2–3 (2023–2025)	Publish a delivery plan for this guidance by January 2023.
SW3	Produce guidance for preparing adaptation plans	MfE	Climate Change	G1, G2, G3	p	Years 3–4 (2024–26)	Publish a delivery plan for this guidance by January 2024.
SW3	Regularly update the guide to local climate change risk assessments	MfE	Climate Change	G3	p	Year 5 (2026/27)	Confirm that this update is still on track to be carried out in the 2026/27 financial year.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
SW2	Complete the Data Investment Plan project	Stats NZ	Statistics	G1	c	Years 1–6 (2022–28)	Cabinet has endorsed the Data Investment Plan, which is a prioritised plan to guide investment in data over the next 10 years. Enhancing climate change data is one of the 30 prioritised investment opportunities identified in the plan. The provisional investment pipeline includes climate change in years 1–3.
SW2	Develop Future Pathways for the Research, Science and Innovation System programme	MBIE	Research, Science and Innovation	G2, G5	c	Years 1–6 (2022–28)	By mid 2024, Cabinet agrees direction of travel for Te Ara Paerangi – Future Pathways programme.
SW2	Complete case study to explore co-investment for flood protection	DIA	Local Government	E1, G2, G3, H1	c	Years 1–2 (2022–24)	June 2022, Ministers will receive a strategic business case from Buller District Council and West Coast Regional Council on a package of flood resilience options to reduce flood risk in Westport.
SW2	Improve how science, data and knowledge is used to inform emergency management	NEMA	Emergency Management	G1, G6	c	Years 1–6 (2022–28)	Science, data and knowledge of natural hazards, including extreme weather events, are increasingly shared across all parts of the emergency management system.
SW2	Develop 3D coastal mapping	LINZ	Land Information	G1	p	Years 1–2 (2022–24)	Business case for 3D mapping is developed by December 2022. Work is underway and at least 40% complete by March 2023.
SW2	Implement the programme: Climate Crisis - Defence Readiness and Response	MOD	Defence	G1, G6, H4	p	Years 1–6 (2022–28)	TBC

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
SW2	Produce new tools and guidance specific to mātauranga Māori and mātauranga indicators	MfE	Climate Change	G1, G4	p	Years 3–4 (2024–26)	Publish a delivery plan for this guidance by January 2024.
SW2	Produce guidance and tools for monitoring and evaluating the impact of adaptation initiatives	MfE	Climate Change	G1, G3, G7	p	Year 3 (2024/25)	Publish a delivery plan for this guidance by January 2024.
SW2	Produce an adaptation professional development programme for key practitioners	MfE	Climate Change	G1, G3	p	Years 4–5 (2025–27)	Confirm that this update is still on track to begin in the 2025/26 financial year.
SW2	Explore definitional tools to support greater investment	MfE	Climate Change	E1, E2, G1, G2, G5	p	Years 1–3 (2022–25)	International best practice will be explored in 2022, and a view towards determining applicability in New Zealand. Following on from this, there will be engagement with the private sector.
SW2	Explore additional interventions to mobilise investment	MfE	Climate Change	E1, E2	p	Years 3–5 (2024–27)	Not applicable – action to be delivered after August 2024.
SW3	Public investment in climate change initiatives	Treasury	Finance	E1	c	Years 1–6 (2022–28)	Update the criteria of the Climate Emergency Response Fund in 2022 to extend the scope to fund adaptation measures.
SW3	Ongoing regulatory stewardship	All	All	G2	c	Years 1–6 (2022–28)	Ongoing requirement.
NE1	Implement the DOC Climate Change Adaptation Action Plan (CCAAP)	DOC	Conservation	N1, N2, N3, N4, N5, N6, N7, N8, N9, N10, N11, N12, H5, H6, H8, E3, E4, G1, G2, G4	c	Years 1–4 (2022–25)	By 2024, a reporting framework on the implementation of the CCAAP will be in place. DOC adaptation work progress against the framework will be reported on.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
NE1	Implement the proposed National Policy Statement on Indigenous Biodiversity (NPS IB)	MfE/DOC	Environment, Conservation	G4	c	Years 1–6 (2022–28)	By August 2024, the National Policy Statement for Indigenous Biodiversity is ratified and implementation has begun.
NE1	Implement the Water Availability and Security programme	MPI (MfE support)	Agriculture	N7, N1, E5, N8, N10	c	Years 1–6 (2022–28)	By 2024, the Ministry for Primary Industries (MPI) will form a permanent team and commence addressing issues of water availability and security within our primary sectors and rural communities. This work will include partnering with Māori, communities and other impacted sectors to deliver multi-purpose, multi-benefit solutions.
NE2	Deliver a collection of actions run by Biodiversity New Zealand						
NE2	Pilot the on-farm biosecurity programme	MPI	Agriculture	N2, E3	c	Years 1–2 (2022–24)	<p>Implement the programme with a focus on four core behaviours to shift culture and attitudes towards biosecurity.</p> <p>Outcome measures (for two years) include measuring changes in the four core behaviours to track programme’s impact against objectives.</p> <p>Monitoring uptake and effectiveness of programme content and activation to refine and scale those with most impact and recommend investment required for the programme over the longer term (5–10 years).</p>

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
NE2	Invest in strengthening border biosecurity	MPI, NZ Customs	Biosecurity	N2, E3	c	Years 1–6 (2022–28)	<p>Mail Pathways Project: 1 June 2023 – opening of the Auckland Processing Centre for Biosecurity Strengthening at NZ Post’s mail facility. The trials with a 3D real-time tomography (RTT) scanner at the current International Mail Centre are on track to start on 16 May 2022.</p> <ul style="list-style-type: none"> • Sea Cargo Programme: The Border Clearance Services Assurance Framework Project will be added to the Sea Cargo Pathways Programme in April 2022. This project will establish key performance indicators to measure the effectiveness of biosecurity risk-management interventions, including a dashboard and headline measure. These indicators are expected to be in place early 2023. • Rollout of the new performance-based verification system to Transitional Facilities has started and is expected to be completed by mid 2023. Fund 1 RTT 3D scanner and two other technology solutions (TBC), artificial intelligence algorithms, and advanced data systems to screen incoming mail and parcels for biosecurity risks.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
NE2	Continue the Freshwater Biosecurity Partnership Programme	MPI	Biosecurity	N7, N10	c	Years 1–6 (2022–28)	By 2024, development and implementation of an updated Freshwater Biosecurity Partnership Programme strategy will be completed, which includes more support for collaboration on developing new or improved detection and control tools.
NE2	Prevent the spread of wilding conifers, and contain or eradicate established areas of wilding conifers by 2030	MPI	Biosecurity	N2, E3	c	Years 1–6 (2022–28)	By the end of 2023/24, the programme will be protecting 4 million hectares of land that is significantly vulnerable to invasion by controlling wilding conifer infestations.
NE2	Continue the National Interest Pest Responses programme	MPI	Biosecurity	N2	c	Years 1–6 (2022–28)	A technical review of each of the National Interest Pest Responses species control programmes will be completed by 2024.
NE2	Invest in Plant Health and Environment Capability	MPI	Biosecurity	N2, N4, N11, H5,	c	Years 1–6 (2022–28)	Detailed Business Case is submitted to Cabinet approval in quarter four 2022.
NE2	Utilise the Animal Health Laboratory (AHL) and Plant Health Environment Laboratory (PHEL)	MPI	Biosecurity	N2, N4, N11, H5,	c	Years 1–2 (2022–24)	Enhance the diagnostic capabilities to manage new and suspected exotic pest and diseases through an operational research programme and collaboration with internal and international organisations. Retain technical expertise through MPI career progression opportunities.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
NE1	Reform the Environmental Reporting and Monitoring System to allow better measurement of environmental change	MfE	Environment	G1	c	Years 1–6 (2022–28)	By 2024, the Environmental Reporting Act 2015 will be amended and the changes implemented.
NE1	Deliver Jobs for Nature to restore indigenous ecosystems	MfE/DOC/ MPI	Environment/ Conservation	N2, N4, N11, H5, H6	c	Years 1–6 (2022–28, some projects ongoing)	The Jobs for Nature Programme is a \$1.219 billion cross-agency investment in nature-based employment. As at 31 December 2021, of the projects that have reported timeframes for their planned spend (which total approximately \$946 million in value), 92% (\$874 million) is forecast to be spent by the end June 2024.
NE1	Implement the National Policy Statement on Freshwater Management 2020 (NPSFM)	MfE	Environment	N3, N4, N5, N6, N7, G1, G2, G3	c	Years 1–6 (2022–28)	Regional councils will notify plans implementing the NPSFM by the end of 2024.
NE1	Implement the Revitalising the Gulf: Government action on the Sea Change Plan	DOC, FNZ	Conservation/ Oceans and Fisheries	N1, N2, N4, N5, N7, N11, N12	c	Years 1–2 (2022–24)	Revitalising the Gulf’s package of integrated marine conservation and fisheries management actions is implemented to improve the health of the Hauraki Gulf Marine Park.
NE1	Implement the South-east Marine Protection Initiative	DOC	Conservation/ Oceans and Fisheries	N7, N1, E5, N8, N10	c	Years 1–2 (2022–24)	A marine protected area network is implemented in the south-eastern South Island coastal region and co-management arrangements are established across the Kāi Tahu rohe moana.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
NE1	Implement the Sustainable Land Management Hill Country Erosion Programme	MPI	Forestry	N7, H1, H3, H4, H5, E1, E3, B1,	c	Year 1 (2022/23)	The number of hectares treated through Hill Country Erosion Funding in 2021/22. Progress under the Hill Country Erosion Programme is measured by the number of hectares of erosion-prone land treated each year. The programme receives baseline funding but operates under four-year contracts with councils and contracts span 2019/20–2022/23. The targets for those four years are: 4,700 ha, 4,900 ha, 6,100 ha, 6,800 ha. Targets for the following four years can either be estimated when the budget is confirmed in May or confirmed when contracts are in place in late 2022.
NE1	Provide a forestry planning and advisory service	MPI	Forestry	G6, N3, N6	c	Years 1–6 (2022–28)	Planning and advice functions will be agreed by June 2023.
NE1	Prioritise nature-based solutions and implement Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 (ANZBS)	DOC	Conservation	N1, N2, N3, N4, N5, N6, N7, N8, N9, N10, N11, N12, H5, H6	p	Years 1–6 (2022–28)	By 2024, a reporting framework on the implementation of Te Mana o te Taiao will be in place, to report on shared work programmes delivering on integrated across agencies and the wider sector.
NE1	Develop mātauranga Māori indicators of climate impacts on the natural environment	MfE	Environment	N11, E3	p	Years 1–2 (2022–24)	Mātauranga Māori indicators have been agreed.
NE3	Establish an integrated work programme to deliver climate, biodiversity and wider environmental outcomes	DOC/MfE	Conservation/ Environment	N1, N4, N11, B1	p	Years 1–4 (2022–26)	TBC

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
HBP1	Build property resilience	HUD, MBIE	Housing/Building and Construction	B2, H2, H3, G1	c	Years 1–4 (2022–26)	Initial research stages have been scoped and funded and are underway. By August 2024, sufficient data will be available to inform the development of an assessment framework in years 3–4 (2024–26) and inform regulatory updates.
HBP1	Establish an initiative for resilient public housing	Kāinga Ora	Housing	B2, H2, G5	c	Years 1–2 (2022–24)	By August 2024, we will have understood our material climate risks, developed a conceptual decision-making framework, and determined how the framework should be applied to investment decision making.
HBP1 and HBP2	Embed adaptation in funding models for housing and urban development, and Māori housing	HUD	Housing	B2, H5, H2, E1, E6	c	Years 1–2 (2022–24)	By August 2024, the Ministry of Housing and Urban Development (HUD) will review the funding programmes it administers and amend them to appropriately consider climate-related risks.
HBP3 and HBP4	Support kaitiaki communities to adapt and conserve taonga/cultural assets	MCH	Culture and Heritage	H5	c	Years 1–6 (2022–28)	Working with iwi/Māori and relevant agencies, completed a high-level understanding of existing activities/support for planning and adapting and of potential gaps (2022–23). Begun working with relevant partners on how we might improve support and access to information on cultural assets to help kaitiaki to self-determine adaptation pathways (2023–24).
HBP1	Ensure minimum regulatory requirements for buildings take into account future climate data	MBIE	Building and Construction	B2	p	Years 3–6 (2024–28)	Not applicable – action to be delivered after August 2024.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
HBP1	Manage potential impacts of adaptation related to regulatory change	MBIE	Building and Construction	B2	p	Years 5–6 (2026–28)	Not applicable – action to be delivered after August 2024.
HBP1	Design methodology for risk assessments of public buildings	MBIE	Building and Construction	B2, G1, G5, E1, E6	p	Years 3–4 (2024–26)	Not applicable – action to be delivered after August 2024.
HBP1	Work with community housing providers to enable effective climate hazard response	HUD	Public Housing	B2, H5, H1, H2, G5, G1	p	Years 2–4 (2023–26)	Engagement with community housing provider is completed. Exposure of community housing to climate-related hazards is known; any gaps are identified. What community housing providers need to respond is well understood.
HBP2	Update housing and urban settings	HUD	Housing	B2, H1, H2, H3, G1	p	Years 5–6 (2026–28)	Not applicable – action to be delivered after August 2024.
HBP1	Integrate nature-based solutions into the urban environment	HUD	Housing		p	Years 1–2 (2022–24)	By 2024 the project has been scoped and funded and is underway. The literature review is complete and use of mātauranga Māori is well understood.
HBP3	Partner with iwi to facilitate through Iwi Management Plans	HUD	Housing	B2, H5, H8, G4, G1	p	Years 3–4 (2024–26)	Not applicable – action to be delivered after August 2024.
HBP3	Partner with Māori land owners to increase the resilience of Māori-owned land, homes and cultural sites	HUD	Māori Housing	B2, H5, H8, G4, G5	p	Years 3–4 (2024–26)	Not applicable – action to be delivered after August 2024.
HBP4	Research how cultural heritage contributes to community well-being and climate change adaptation	MCH	Culture and Heritage	H8	p	Years 1–4 (2022–26)	Initial 'literature review' on the current state of knowledge completed. Includes identification of key stakeholders and existing research programmes.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
							Gaps and potential partnerships identified and research strategy under development.
HBP4	Produce guidance for disaster risk management for cultural heritage	MCH	Culture and Heritage	H8	p	Years 2–5 (2023–27)	Current knowledge of disaster risk management in relation to cultural heritage captured and key stakeholders identified and engaged with.
HBP4	Develop a framework for assessing exposure and vulnerability of cultural assets/taonga to climate change	MCH	Culture and Heritage	H8	p	Years 1–3 (2022–25)	Relevant partners (including iwi/Māori and relevant agencies across national adaptation plan) identified. Research on how we identify taonga/cultural heritage at risk from climate change at national and local levels completed. With partners, draft framework developed for engagement with wider interest groups/stakeholders.
I1	Develop a methodology for assessing impacts on physical assets and the services they provide	Te Waihanga	Infrastructure	H1, H2, H3, E1, E6, E7, B1, B3, B4, B5, B6, B7, B8, B2, G6, G1, G3, G5, G8	c	Years 2–3 (2023–25)	In 2023, methodology will be complete.
I3	Scope a resilience standard or code for infrastructure	Te Waihanga	Infrastructure	H3, E1, E7, B1, B3, B4, B5, B6, B7, B8, B2, G2	c	Years 1–2 (2022–24)	By 2024, advice on the best way forward will be complete.
I1	Integrate adaptation into Treasury decisions on infrastructure	Treasury	Infrastructure	N1, N2, N3, N4, N6, H1, H2, H3, E1, E6, E7, E4, B1, B6, B2, G6, G1, G2, G3, G7, G8	c	Years 1–5 (2022–27)	By 2024, advice on the best way forward, and any associated budget bid or Cabinet decisions, will be complete.
I3	Develop and implement the Waka Kotahi Climate Change Adaptation Action Plan	Waka Kotahi	Transport	H1, H2, E1, E4, E6, E7, B5, B6, G1, G6	c	Years 1–6 (2022–28)	By 2024, an adaptation plan will be published and a reporting framework on the implementation of the adaptation plan developed.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
I1	Manage dry-year risk through the New Zealand Battery Project	MBIE	Energy	N3, N4, N6, H2, H3, E1, E7, B1, B3, B4, B5, B6, B7, B8, B2, G1, G6	c	Years 1–6 (2022–28)	Next steps, including performance measures 2024, to be determined after the feasibility study is complete at the end of 2022.
I1	Encourage and support the evaluation of climate-related risks to landfills and contaminated sites	MfE	Environment	B3	c	Years 1–2 (2022–24)	By August 2024, regional councils and unitary authorities, in collaboration with MfE, have undertaken the preliminary assessment of landfill and contaminated sites vulnerable to the effects of climate change in their regions.
I1	Explore funding options to support the investigation and remediation of contaminated sites and landfills vulnerable to the effects of climate change	MfE	Environment	B3	c	Years 4–6 (2025–28)	By August 2024, regional councils and unitary authorities, in collaboration with MfE, have undertaken the preliminary assessment of landfill and contaminated sites vulnerable to the effects of climate change in their regions.
I3	Integrate adaptation into Waka Kotahi decision making	MOT, Waka Kotahi	Transport	B6	c	Year 1 (2022/23)	Waka Kotahi will incorporate adaptation when it applies an intervention hierarchy to existing and new investments in the land transport system.
I2	Progress the rail network investment programme	MOT, Waka Kotahi	Transport	H1, H2, E1, E4, E6, E7, B5, B6, G1, G6	c	Years 1–6 (2022–28)	In shifting to a resilient, reliable and safe network, the programme identified 21 targets to be met before August 2024 (and a further 6 to be met by June 2031), with ongoing reporting against these measures to be provided by KiwiRail.
I3	Invest in public transport and active transport	MOT	Transport	H1, H2, H3, E4, E7, B6, G1	c	Years 1–6 (2022–28)	By 2024, Waka Kotahi will be reporting each year on the suite of outcome indicators that have been developed to demonstrate progress on the uptake

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
							and impact of walking, cycling and use of public transport; the Public Transport Operating Manual Review will be complete, and any reforms made and implemented through procurement of new contracts; rapid transit network plans for Auckland, Wellington and Christchurch will be complete; National Integrated Ticketing will be in place; and targets identified in regional mode shift plans for public transport will be met.
I2	Increase uptake of tools to invest in infrastructure in urban areas	HUD, Treasury, DIA	Infrastructure	E1, G2, G3, G5	c	Years 1–5 (2022–27)	Options to address barriers will be developed in the second half of 2022, and 2024 will see either implementation or further policy development.
I3	Support the integration of climate adaptation and mitigation in new and revised standards	Standards NZ	Infrastructure	B1, B3, B4, B5, B6, B7, B8, B2	c	Years 2–6 (2023–28)	Work will begin on relevant standards from 2023.
I2	Develop the National Energy Strategy	MBIE	Energy	H2, H3, E1, B1, B4, B5, B6, B7, B8, B2, G6, G1, G2, G3, G7, G8	p	Years 1–6 (2022–28)	To be determined as part of project planning, which will begin in late 2022.
C1	Raise awareness of climate-related hazards and how to prepare	NEMA	Emergency Management	G6	c	Years 1–6 (2022–28)	By the end of 2024 a public education strategy will be developed for natural hazards and increased availability of information on preparedness for extreme weather events.
C4	Develop the Health National Adaptation Plan (HNAP)	MOH	Health	G2, H3, H7	c	Year 1 (2022/23)	HNAP is expected to be completed by the end of 2022.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
							Regional climate health action plans will be developed from 2023.
C3	Develop the Climate Migration Action Plan	MFAT	Foreign Affairs	G6, H1, H5, H7, G1	c	Years 1–2 (2022–24)	Report to Cabinet completed in 2024.
C1	Building community resilience through social cohesion	MSD	Social Development and Employment	H1, H2	c	Years 2–5 (2023–27)	Policy decisions are received from Cabinet in May/June 2022 on the social cohesion work programme, including the strategic and measurements frameworks, and how to support communities and sectors.
C1	Strengthen teaching and learning related to climate change	MOE	Associate Education	H1, H2, H7, H4	c	Years 1–6 (2022–28)	Refreshed content in the national curriculum for schooling includes learning important for understanding and responding to climate change by end of 2024.
C1	Improve natural hazard information on Land Information Memoranda (LIM)	DIA	Local Government	G3, B2	c	Years 1–4 (2022–26)	Legislative changes will likely have been made to Local Government Official Information and Meetings Act 1987 to provide for improved natural hazard disclosure in LIMs by end of 2024.
C4	Continue with the reform of the health and disability system	MOH	Health	H3, H7	c	Years 1–3 (2022–25)	TBC
C2	Assess socioeconomic and climate vulnerability for Māori	TPK	Māori Development	H2	c	Year 1 (2022/23)	A scope for this work is underway and will be completed by June 2022. This will enable more specific indicators to be developed. Insights have been developed on intersecting Māori climate and socioeconomic vulnerability, and a plan is in place for these to be shared by the end of 2024.

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C2	Continue to overhaul the welfare system	MSD	Social Development and Employment	H1, H2, H3, H7	c	Years 1–6 (2022–28)	Reporting back to Cabinet completed, seeking decisions on policy changes related to ongoing implementation of welfare overhaul initiatives, including potential legislative changes by end of 2024.
C3	Connect communities to wider response and recovery support	NEMA	Emergency Management	G6	c	Years 1–6 (2022–28)	Adoption of new civil defence and emergency management legislation and improved guidance provided across the emergency management system. Implementation and integration of a professional training framework for disaster response and recovery at national and regional levels. This includes recognition of the contribution, and development, of the Māori emergency management workforce.
C1	Expand current funding for proactive community resilience	TPK	Māori Development	G4, H2, H3, H4, H7	p	Years 1–6 (2022–28)	Funding and delivery channels have already been developed for the MCCF and this fund ends in July 2022. Evaluations from the MCCF first phase will be completed in 2022. Next prototype developed focused on community resilience more generally (ie, able to respond to a range of adverse events) and funding is secured for this next phase by end of 2024.
C4	Assess healthcare service resilience	MOH	Health	H3, H7, E7, G5	p	Years 1–2 (2022–24)	Desktop national climate change risk assessment completed by May 2022. Guidance material provided for the sector and a set of recommendations produced for Health NZ.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
							Regional assessments to be completed as part of the next phase of health adaptation planning (starting from 2023).
EF1	Deliver the national Freight and Supply Chain strategy	MOT	Transport	E7	c	Years 1–6 (2022–28)	By the middle of 2023, the Government has launched the national Freight and Supply Chain strategy.
EF1	Deliver the fisheries system reform	MPI	Oceans and Fisheries	E5, H6	c	Years 2–5 (2023–26)	By 2024, the Government is releasing implementation plans for the Aquaculture Strategy each year, and is reporting each year on the environmental effects of aquaculture.
EF1	Deliver the Aquaculture Strategy	MPI	Oceans and Fisheries	E5, E7	c	Years 1–4 (2022–26)	By 2024, the Government releases implementation plans for the Aquaculture Strategy, and report annually on the environmental effects of aquaculture.
EF2	Support high-quality implementation of climate-related disclosures and explore expansion	MfE, MBIE	Climate Change; Commerce and Consumer Affairs, supported by the XRB and FMA	G2, G3, G8, E2	c	Years 1–6 (2022–28)	By 2024, the Government has decided whether to extend mandatory climate-related disclosure requirements to public entities.
EF2	RBNZ supports the stability of the financial system	RBNZ	Finance	E2	c	Years 1–2 (2022–24) and ongoing	By August 2024, the RBNZ will have climate change considerations increasingly integrated into its supervisory, stress testing and policy work.
EF2	Develop options for home flood insurance issues	Treasury	Earthquake Commission	E6	c	Years 1–3 (2022–25)	By the end of 2022, the Government has received advice on flood insurance options and agreed to next steps.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
EF2	Consider climate risk in economic and fiscal monitoring and forecasting	Treasury	Finance	E1	c	Years 1–6 (2022–28)	Four 6-monthly economic and financial updates published between August 2022 and August 2024.
EF1	Design and implement the Farm Monitoring Programme to determine farm performance	MPI	Agriculture	E3, E5, H6, G5	c	Years 1–2 (2022–24)	A published business case for climate change mitigation planning by December 2022 for plans suitable for farmers and catchment groups The number of farms actively involved in catchment groups for mapping of soils to guide farmers to develop integrated farm plans that protect and use their soils and supporting catchment groups to identify changes in land use.
EF1	Implement the Government response to the Prime Minister’s Chief Science Advisor’s report on commercial fishing	MPI	Oceans and Fisheries	G5, E5, G2, H6	c	Years 1–6 (2022–28)	Delivery of Government response (May–June 2022). Ongoing implementation of actions identified in the response.
EF1	Support the Aotearoa Circle Climate Change Adaptation Strategy for Seafood Sector	MPI	Oceans and Fisheries	E5, E6, G2, G5	c	Years 1–6 (2022–28)	Support implementation of actions for aquaculture and fisheries in the Aotearoa Circle Climate Change Adaptation Strategy for the Seafood Sector.
EF1	Deliver the Tourism Industry Transformation Plan (ITP)	MBIE	Tourism	E4, B6	c	Years 1–3 (2022–25)	Complete the environment pillar of the Tourism ITP, including a roadmap for the industry on climate adaptation, by quarter 4 2023.
EF1	Meeting the costs of a climate-resilient tourism sector	MBIE	Tourism	E4, B6	c	Years 1–2 (2022–24)	By August 2024, the settings for the International Visitor Conservation and Tourism Levy have been reviewed.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
EF1	Leverage government procurement for climate outcomes	MBIE	Economic and Regional Development	B2, B6	c	Year 1 (2022/23)	By August 2023, the current government procurement policy framework has been reviewed to ensure it enables mitigation and adaptation in government procurement.
EF2	Monitor residential insurance premiums	Treasury, EQC	Earthquake Commission	E6	c	Years 1–2 (2022–24)	By October 2022, the Treasury will have data to show insurance prices. These data will be updated regularly.
EF2	Improve consumer understanding of property insurance pricing and risks	Treasury	Finance	E6	c	Year 1 (2022/23)	By 2024, the information to improve consumer understanding of property insurance (in English) is already published.
EF1	Continue prioritising research and investment in climate-related science	MBIE	Research, Science and Innovation	H5, H6, E3, E4, E5,	c	Years 1–6 (2022–28)	Continue to align research priorities with climate-related science in line with Cabinet decisions about Te Ara Paerangi – Future Pathways programme.
EF1	Continue delivering the Sustainable Land Management and Climate Change (SLMACC) and the Greenhouse Gas Inventory research programmes	MPI	Agriculture	E3, E5	c	Years 1–6 (2022–28)	A suite of outputs from funded science projects, in the form of data, information, reports, decision support tools and official inventory to help the sectors adapt to climate change, measure emissions and mitigate land-use impacts on freshwater.
EF1	Continue delivering the Sustainable Food and Fibre Futures Fund	MPI	Agriculture	E3, E5	c	TBC	The annual number of, and corresponding MPI investment in, projects with clear direct or indirect implications for climate adaptation in the primary sector.

Objective	Title	Lead agency	Relevant portfolio	NCCRA risks addressed	Status	Timeframe	Implementation progress expected by August 2024
EF1	Support Māori small business resilience and transitions	TPK	Māori Development	E3, E4, E5, H2	p	Years 1–4 (2022–26)	By August 2024, resilience and transition supports for Māori small and medium enterprises are established and have been accessed by 1,000 Māori small and medium enterprises.
EF1	Deliver the Māori agribusiness extension	MPI	Agriculture	E3, H5, H6, G4	p	Years 1–6 (2022–28)	Terms of reference for the steering group to lead development of the tikanga-based programme are in place by November 2022. Two MABx panels will assess project proposals by June 2023 for the Māori advisors aspect.
EF1	Research business adaptation preparedness and provide guidance for small businesses to adapt	MBIE	Small Business	TBC	p	Years 1–6 (2022–28)	TBC
EF1	Establish innovation grants, such as project grants	MBIE	Research, Science and Innovation	G5	p	Years 1–6 (2022–28)	TBC
EF1	Promote more industry partnership networks	MBIE	Research, Science and Innovation	G5	p	Years 1–6 (2022–28)	TBC
EF1	Identify the impacts of climate change on regional economies	MBIE	Economic and Regional Development	G5, E3, H2, E4	p	Years 1–3 (2022–25)	By August 2024, the initial regional economic research on land-based primary sectors is 80% completed.

Appendix 4: Roles and responsibilities for adaptation

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Central government</p>	<p>Partner with iwi/Māori</p> <p>Partner with local government</p> <p>Legislative and policy frameworks</p> <p>Funding and financing arrangements</p>	<p>Increase public awareness of climate change and national risks</p> <p>Communicate information on roles and responsibilities</p>	<p>Set priorities and coordinate research across government</p> <p>Fund research</p> <p>Develop and share locally relevant data and information on national risks</p> <p>Set methodologies or data quality standards</p> <p>Maintain database of information</p>	<p>Develop tools, guidance and processes</p> <p>Provide expertise to assist decision making</p> <p>Provide training and support to local government</p>	<p>Participate in regional planning</p> <p>Set nationally consistent risk tolerances, thresholds and trigger points</p>	<p>Manage risks to public goods and assets</p> <p>Respond to national emergencies</p> <p>Provide physical and mental health services</p> <p>Provide natural disaster insurance</p>	<p>Monitor implementation and effectiveness of national adaptation plan, policy and legislation</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Local government</p>	<p>Partner with iwi/Māori</p> <p>Partner with central government</p> <p>Local and regional councils align and coordinate plans and strategies</p>	<p>Increase public awareness of local and regional risks</p>	<p>Share information on risks to homes and assets</p> <p>Fund local research</p> <p>Support inclusion of mātauranga Māori in local risk assessments</p>	<p>Develop tools, guidance and processes</p> <p>Resource community to participate</p>	<p>Develop regional and local plans for adaptation</p> <p>Plan and implement upgrades to assets and infrastructure</p>	<p>Co-design adaptation solutions with iwi/Māori</p> <p>Manage risks to public goods and assets</p> <p>Lead discussions with communities</p> <p>Respond to local emergencies</p>	<p>Monitor effectiveness of local plans, policies and actions</p>

Iwi/Māori	Partner with central and local government	Increase awareness of risks with support of central and local government	Develop best practices that recognise data sovereignty Increase development of datasets with specific iwi/Māori focus Resource development of mātauranga Māori	Develop tools, guidance and processes	Support new resource management system	Co-design adaptation solutions with local government Provide physical and mental health services for iwi/Māori	Monitor effectiveness of iwi adaptation plans, policies and actions Monitor risks to iwi/Māori and effectiveness of government policies
Private sector		Share risk information within business and industry networks	Disclose risks to public and customers Insurance sector informs customers of developments in the market	Share tools and best practice within business and industry networks	Assess risks to vulnerable sectors and individual businesses	Manage risks Develop new technologies and business solutions Leverage opportunities of changing climate Provide finance	Monitor risks to vulnerable sectors and individual businesses
Academia		Share research and data to increase awareness	Develop data, projections, research and information Support mātauranga Māori research	Contribute to development of tools, guidance and processes	Plan to address relevant risks	Manage risks to private assets and incomes	Monitor policy effectiveness Provide critical assessment of action or inaction
Communities and individuals		Raise awareness of local risks within networks	Contribute information on specific risks		Plan to manage risks to private assets and incomes, purchase insurance	Manage risks to private assets and incomes Co-design local solutions with local government	
	Legislative and institutional arrangements	Raise public awareness	Develop and share data and information	Improve capacity	Plan	Take action	Monitor, report and evaluate

References

- BERL. 2021. *Te Ōhanga Māori 2018: The Māori Economy 2018*. BERL.
- Climate Change Adaptation Technical Working Group. 2017. *Adapting to Climate Change: Stocktake Report from the Climate Change Adaptation Technical Working Group*. Wellington: Climate Change Adaptation Technical Working Group.
- Deep South Challenge. 2021. *Growing Kai Under Increasing Dry: How does the primary sector in Aotearoa adapt to a changing climate with a changing drought profile?* Summary of joint National Science Challenge rolling symposium.
- Frame D, Rosier S, Carey-Smith T, Harrington L, Dean S, Noy I. 2018. *Estimating Financial Costs of Climate Change in New Zealand: An Estimate of Climate Change-Related Weather Event Costs*. New Zealand Climate Change Institute and NIWA. .
- Insurance Council of New Zealand. 2021. Record insurance support for communities – 2021 extreme weather claims exceed \$300 M. Retrieved from <https://www.icnz.org.nz/media-resources/media-releases/single/item/record-insurance-support-for-communities-2021-extreme-weather-claims-exceed-300-m> (4 April 2022).
- IPCC. 2014. *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
- IPCC. 2018: Annex I: Glossary [Matthews, J.B.R (ed.)]. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*.
- IPCC. 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
- Ministry for the Environment. 2020. *National Climate Change Risk Assessment for Aotearoa New Zealand: Main report – Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa: Pūrongo whakatōpū*. Wellington: Ministry for the Environment.
- Ministry for the Environment. 2020a. *National Climate Change Risk Assessment Technical Report*. Wellington: Ministry for the Environment.
- Paulik R, Stephens S, Wadhwa S, Bell R, Popovich B, Robinson B. 2019. *Coastal Flooding Exposure Under Future Sea-level Rise for New Zealand*. Wellington: NIWA.
- Stats NZ. 2022. Business operations survey: 2021. Retrieved from <https://www.stats.govt.nz/information-releases/business-operations-survey-2021> (4 April 2022).
- The Treasury. 2021. *Te Tirohanga Mokopuna 2021: The Treasury's combined Statement on the Long-term Fiscal Position and Long-term Insights Briefing*. Wellington: The Treasury.