

# NATIONAL RESILIENCE PROGRAMME BUSINESS CASE

## Executive summary

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VERSION 2.6

## RECOMMENDATIONS

The decision this National Resilience Programme Business Case (NRPBC) is seeking from the Waka Kotahi NZ Transport Agency Board is for the Board to:

- **Support** the National Resilience Programme Business Case which prioritises major and extreme natural hazard (including climate change related) risks in the New Zealand land transport system and recommends an integrated suite of system responses.
- **Note** that responses to the highest priority risks and sites will be submitted for consideration into the 2021–24 National Land Transport Programme (NLTP);
- **Note** that the evidence base, risk prioritisation methodology and decision-making framework will be made available to our partner organisations.

## PURPOSE

This National Resilience Programme Business Case was commissioned to:

- Provide an evidence base of the nationally extreme and major risks posed to the New Zealand land transport system from a natural hazards perspective;
- Deliver an associated agreed, preferred and integrated suite of system responses that Waka Kotahi and its investment partners could implement to address the identified risks and best achieve the benefits and outcomes defined by this case. These responses represent the high-level strategic interventions (especially focussed on the NLTP) or initiatives across the Waka Kotahi Resilience Programme to address the resilience risks, issues, deficiencies and opportunities in or affecting the land transport system, including those geographical sites identified in the evidence base; and
- Reflect the significance of resilience issues affecting the land transport system and associated infrastructure.

This case also identifies potential actions for the Waka Kotahi Business Plan and for Regional Land Transport Plans.

## BACKGROUND

Waka Kotahi commissioned the development of a National Resilience Programme Business Case following on from the work commenced by the National Resilience Strategic Case (NRSC).

This case is the latest in a series of studies and cases that seek to improve how the Agency appropriately embeds resilience into its business and investment planning. The National Strategic Resilience Strategic Case that was approved in January 2019 included the agreed objectives that it would:

- Improve the ability for communities to make informed decisions about resilience and prepare for, withstand, absorb, continue functioning after and recover quickly from adverse events;
- Prioritise planning and investment in improving transport system resilience that meets user and community tolerances and risk appetite;
- Position Waka Kotahi in a leadership role as a strong influencer for the whole of the transport system and the communities to which it provides access; and
- Enhance New Zealand's capacity to cope with unplanned disruptive events thereby supporting the wellbeing and prosperity of all New Zealanders.

The original NRSC was largely undertaken as an internal exercise. This NRPBC has tested the issues raised by that case with a range of national-level stakeholders to validate the challenges and problems identified and identify potential system and strategic responses. Many of the issues and potential responses have been covered in parallel activity including the development of Arataki and the Investment Decision Making Framework Review.

In parallel, a desktop evaluation of resilience related risks based on hazard and asset data was conducted to generate a preliminary view of priority risks for the land transport system. Testing of this preliminary analysis was undertaken with stakeholders through a series of regional workshops throughout New Zealand and ground truthed against existing climate change research.

The risk assessment aimed to identify extreme and major risks across the land transport system with regards to natural hazards: 'shock' events, as well as slow onset and climate change induced hazards.

## STRATEGIC RELEVANCE

Resilience of New Zealand's land transport system, including in the face of a changing natural hazard context is a matter that has been investigated extensively. Resilience and the impacts of a changing climate have been canvassed through the GPS (2018), the Ministry of Transport's Resilience and Security Strategic Framework, and the Waka Kotahi Statement of Intent, Resilience Framework and Arataki: Our (Waka Kotahi) plan for the land transport system.

Improving how resilience is incorporated into investment and decision-making thinking is likely to lead to changes in how the Agency considers and prioritises investments. This is also reflected in the draft GPS (2021) which was released in March 2020 for consultation. This NRPBC therefore represents another milestone on the journey to continually update and improve how we best deliver land transport resilience. In March 2020 New Zealand was impacted by the global COVID-19 pandemic. At the time of writing the medium- and long-term implications of the pandemic are unclear, but it is likely that that priorities across New Zealand are likely to change. However, resilience aspects remain relevant and there is an opportunity to progress / integrate resilience planning as part of the infrastructure projects that are anticipated as part of the economic stimulus package announced in response to the pandemic.

# KEY ISSUES

Key problems identified with stakeholders are set out in Figure 1.

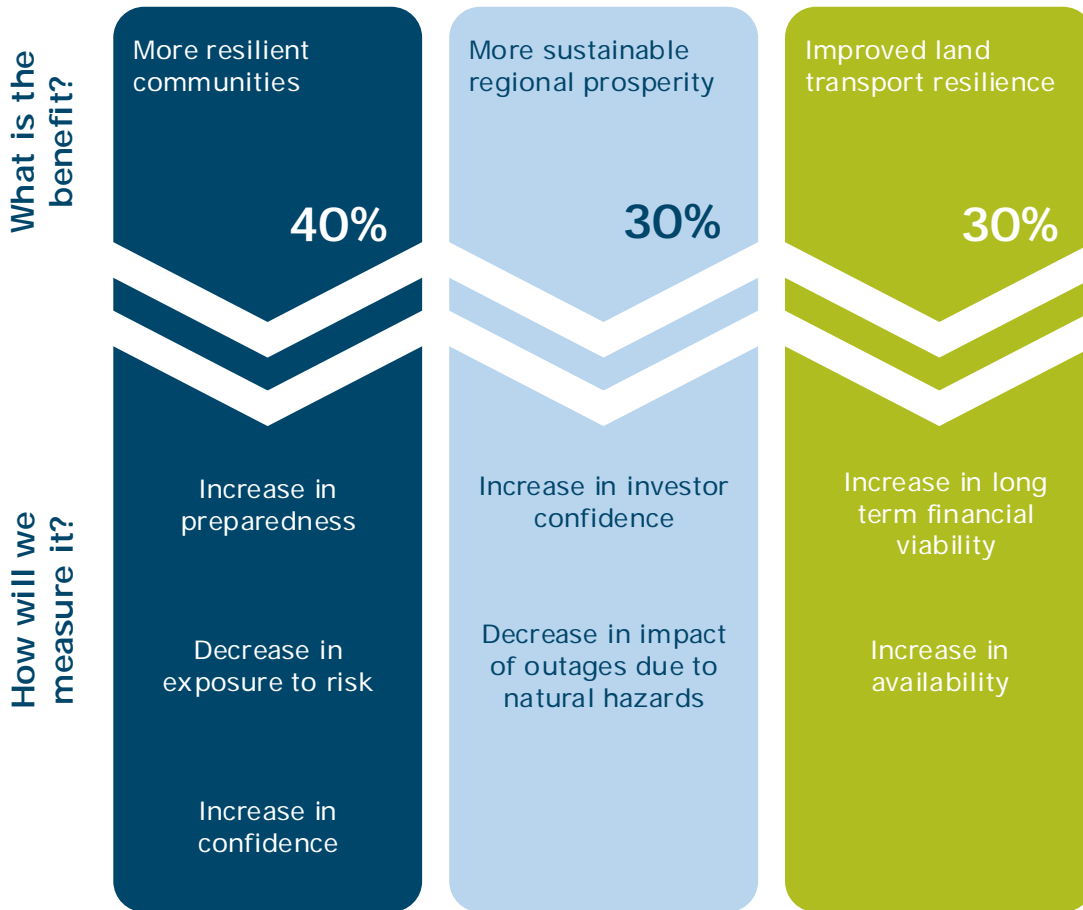
Figure 1: NRPBC problem overview



# KEY BENEFITS

The key benefits we could expect to see from resolving the identified problems are set out in Figure 2 and discussed below.

**Figure 2: Benefits and KPI's**



## More resilient communities

Our communities would be better protected from impacts and outages in the land transport system as a result of natural hazards and would be more resilient when events do occur. Because extreme events will occur, and will happen more frequently, it is essential that communities are better prepared to manage the effects of these events when they do occur.

If we have good information on the level of risk communities are exposed to, and have taken steps to avoid, minimise, or manage those risks, the residual risk that communities are exposed to would be increasingly acceptable.

People would therefore have increasing confidence that the risks posed to their health, safety and lifestyle are within acceptable tolerances.

## More sustainable regional prosperity

Investor confidence is important if regions are to prosper. Investors need reasonable assurance that the level of risk posed by natural hazards to critical business linkages is minimised or managed appropriately to avoid and minimise reasonably foreseeable disruptions on critical routes.

The two KPI measures proposed would assess the contribution that resilience in the land transport system would make to enabling regional prosperity and stability.

## Improved land transport resilience

Long term resilience of our land transport system means we would have both understood and factored in the whole-of-life costs – including repairs and maintenance – when making investment decisions.

Shifting to a model that requires us to consider the levels of service desired and driven by the Living Standards Framework against that backdrop of both long-term physical asset resilience and financial impacts may require us to reassess aspects of our land transport system and make decisions that could be quite different to aspects of the system we have today.

## KEY OUTPUTS

### System responses

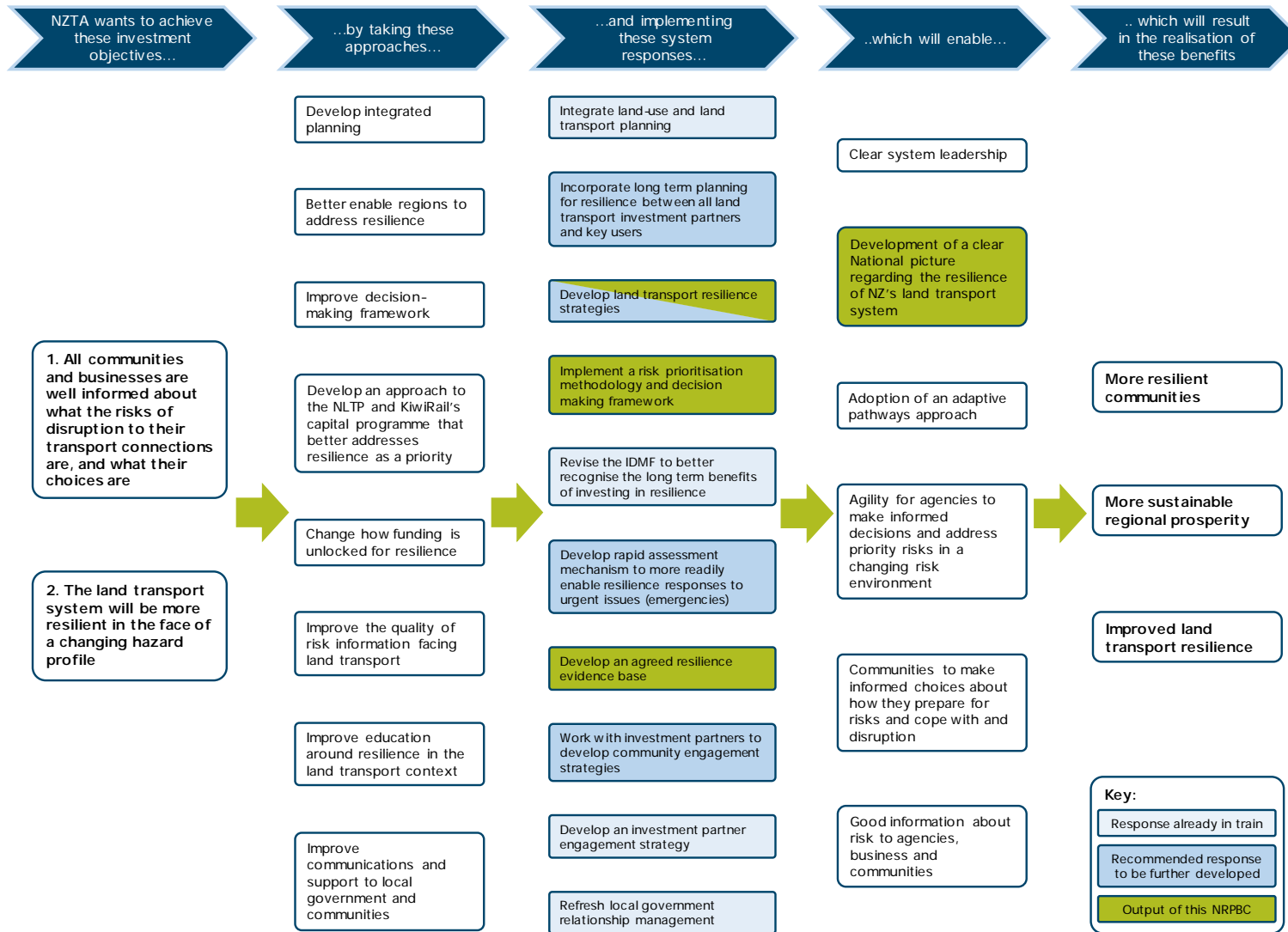
High-level approaches were tested with stakeholders and a suite of system level responses was derived. These responses were then refined with Waka Kotahi staff in a workshop in December 2019 and tested in one-on-one meetings with national level stakeholders. A set of approaches and a preferred programme have been derived through an economic assessment. An Outcomes Framework was prepared to identify how the identified approaches and system responses would deliver the objectives and benefits sought by Waka Kotahi from this work. This is set out in Figure 3.

Several of the responses are already in train – through Arataki and through the Investment Decision Making Framework Review. The Key Issues and Key Benefits identified in the preparation of this case support the activity completed or underway through these projects including integrating land use, spatial planning and transport planning, collaboration with investment partners and ensuring investment decisions recognise the benefits of improved resilience taking an integrated view of the land transport system.

Identifying prioritised risks is an important response when considered alone. Successfully addressing the risks relies on the effective implementation of the other responses identified in the programme requiring an integrated approach. For example, business cases for a resilience focussed intervention may not secure funding unless the Investment Decision Making Framework (IDMF) review elevates the influence of resilience in prioritising investment across the NLTP or may not consider alternative options to 'building our way out'.

Figure 3: Outcomes Framework for the preferred package of system responses

## IMPROVING THE RESILIENCE OF OUR LAND TRANSPORT NETWORK TO NATURAL HAZARDS



## Programme options

Four broad approaches have been derived by grouping the system responses. Each option below builds on the prior option. So, Option 3 (integrated investment model) builds on Option 2 (Do Minimum). These options were derived and tested with key stakeholders through one on one meetings.

**Table 1: Programme options**

OPTION	DESCRIPTION	INCLUDES THESE STRATEGIC RESPONSES	ADVANTAGES	DISADVANTAGES	COMMENT
1	<p><b>Current state (status quo):</b> This option reflects current state plus initiatives that are already in train either to improve resilience, or that would provide resilience benefits.</p>	<ul style="list-style-type: none"> <li>Integrate land-use and land transport planning;</li> <li>Revise the IDMF to better recognise the long-term benefits of investing in resilience;</li> <li>Develop an investment partner engagement strategy;</li> <li>Refresh local government relationship management.</li> </ul>	<ul style="list-style-type: none"> <li>Continues current models with evolutionary changes that do not require significant additional change effort at regional level.</li> </ul>	<ul style="list-style-type: none"> <li>Investment decisions would continue to be tactical and resilience considerations susceptible to being traded off against more urgent priorities;</li> <li>Risks that sub-optimal investment decisions are made for emergency repairs and low-cost investments, further locking in non-resilient investments;</li> <li>Communities would continue to make decisions on the current state of infrastructure, not factoring opportunities or future changes;</li> <li>No national picture of resilience challenges facing NZ, nor understanding of the magnitude of risk is developed;</li> <li>Would not fulfil requirements for adaptation planning under the Climate Change Response (Zero Carbon) Amendment Act;</li> <li>Would not achieve step-change identified in Arataki.</li> </ul>	<p>Levels of service would continue to decline across the system in the medium to longer term, costs of repairs would continue to rise and communities would be increasingly disrupted.</p>
2	<p><b>Resilience issues, and approaches for risk management are identified:</b> This package creates a national picture of issues and provides mechanisms for identifying how they might best be addressed.</p>	<ul style="list-style-type: none"> <li>Option 1 responses plus;</li> <li>Implement risk prioritisation methodology and decision-making framework;</li> <li>Develop a rapid assessment mechanism to more readily enable resilience responses to urgent issues (emergencies);</li> <li>Develop an agreed resilience evidence base.</li> </ul>	<ul style="list-style-type: none"> <li>Better national picture of the resilience risks facing NZ;</li> <li>Availability of tools to assist regional decision-making and ensure that more resilient options are factored into RLTPs;</li> <li>More effective response to urgent issues (emergencies).</li> </ul>	<ul style="list-style-type: none"> <li>Decision-making can still be ad hoc and tactical, locking in sub-optimal options;</li> <li>Communities would continue to make decisions on the current state of infrastructure, not factoring opportunities or future changes;</li> <li>Unlikely to achieve step-change identified in Arataki.</li> </ul>	<p>Levels of service are likely to continue to decline, but better information available about risks and disruption may be better managed.</p>

OPTION	DESCRIPTION	INCLUDES THESE STRATEGIC RESPONSES	ADVANTAGES	DISADVANTAGES	COMMENT
3	<p><b>Integrated investment model:</b> This option builds on the previous option and establishes long term resilience planning in the form of resilience strategies, that are used to inform long term planning and investment and provide a resilience blueprint to guide short term and emergency works. The community is engaged in the process and are aware of the challenges, and how those can be resolved, including the use of non-infrastructural options.</p>	<ul style="list-style-type: none"> <li>• Option 2 responses plus;</li> <li>• Incorporate long term planning for resilience between all land transport investment partners and key users;</li> <li>• Develop land transport resilience strategies;</li> <li>• Work with investment partners to develop community engagement strategies.</li> </ul>	<ul style="list-style-type: none"> <li>• Transparency of trade-offs made to ensure that long term investments are in the best interests of the community and systems;</li> <li>• Co-benefits streams from integrated investment such as safety, connectivity can be realised, resulting in better value for money;</li> <li>• Clear path for resilience decision-making in short-term and emergency repair considerations;</li> <li>• Community is clear what the risks of natural hazards are to community and business interests, and can plan for known disruption;</li> <li>• Greater buy-in from all parties;</li> <li>• Should deliver on adaptation aspects of Climate Change Response (Zero Carbon) Amendment Act requirements;</li> <li>• Delivers on Arataki step change.</li> </ul>	<ul style="list-style-type: none"> <li>• Clear knowledge about decisions that need to be taken for resilient outcomes, yet trade-offs against other more urgent or shorter-term outcomes are still possible.</li> </ul>	<p>This option is most likely to enable the current level of service across the land transport system to be maintained, by identifying and enabling more sustainable choices to be made, including retreat. It also delivers aspirations of Arataki's step change.</p>
4	<p><b>Invest for resilience:</b> This option further develops the integrated investment model. Resilience is made a priority at a national</p>	<ul style="list-style-type: none"> <li>• Option 3 responses plus;</li> <li>• Develop funding model for non-transport infrastructure solutions;</li> </ul>	<ul style="list-style-type: none"> <li>• Resilience investment decisions are protected against ad hoc re-prioritisation decisions;</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of over-investment in resilience in comparison for the benefits received;</li> <li>• Prioritisation of resilience compromises investments targeted at other benefit streams;</li> </ul>	<p>This option would enable NZ to get ahead of the challenges and make strategic investments that support system and community resilience</p>



OPTION	DESCRIPTION	INCLUDES THESE STRATEGIC RESPONSES	ADVANTAGES	DISADVANTAGES	COMMENT
	level, and a protected fund is established to ensure continual progress.	<ul style="list-style-type: none"> <li>Establish a targeted resilience fund.</li> </ul>	<ul style="list-style-type: none"> <li>Supports regional development;</li> <li>The overall resilience of the land transport system improves over time.</li> </ul>	<ul style="list-style-type: none"> <li>Potential lost opportunity for multi-outcomes solutions.</li> </ul>	and get beyond transport solutions.

## Programme options analysis

Table 2 sets out how the options respond to investment objectives and critical success factors.

**Table 2: Programme options analysis (completed in December 2019 i.e. pre COVID-19)**

		1. Status Quo	2. Improved decision-making	3. Integrated investment model	4. Invest for resilience
<b>Description</b>		Includes integrate land-use and land transport planning, revise the IDMF, investment partner engagement strategy and refresh local government relationship	Status Quo responses plus risk prioritisation methodology and decision making framework, rapid assessment mechanism and evidence base	Do Minimum responses plus long terms resilience planning between investment partners, regional resilience strategies, and community engagement strategies	Preferred responses plus funding model for non-infrastructure solutions targeted resilience programme.
<b>Investment Objectives</b>	All communities and businesses are well informed about what the risks of disruption to their transport connections are, and what their choices are	No	Partial	Partial	Yes
	The land transport system will be more resilient in the face of a changing hazard profile	Partial	Partial	Yes	Yes
<b>Critical Success Factors</b>	Strategic Fit	Aligned to GPS, MoT Transport Outcomes Framework, NZTA Resilience Framework	No	Partial	Yes
	V for M	Must demonstrate good benefits for the expenditure required	Yes	Yes	Yes
	Afford	Can be done within existing budgets	Yes	Partial	Partial
	Achieve	Agencies have the capability and capacity to deliver	Yes	Yes	Yes
	Feasibility	Possible to deliver in current environment	Yes	Yes	Yes
<b>Summary</b>		Makes some progress towards resilience, but investment decisions likely to be tactical rather than strategic	Establishes a methodology for prioritising resilience risks, and a national view of the challenges, and provides mechanisms that enable repair work to take resilience into account, but remains tactical	Provides a strategic view of risks and preferred approaches that guides and informs investment planning in the long term, short term and for emergency works. Increases community engagement to ensure that communities are well informed.	Provides a strategic view of risks and preferred approaches, and creates a protected funding mechanism to ensure that resilience investments do not get crowded out by other priorities.
<b>Comment</b>		Status quo option	Do minimum option	Preferred option	Ideal option

## Recommended programme at system level

A number of these responses (see Figure 3) are either being canvassed through other programmes of work or have already been agreed. Responses therefore fall under three categories:

1. Responses that are already underway (but not implemented) or are part of another programme of work (coloured light blue in Figure 3). Achieving the outcomes of this programme are dependent on these initiatives being completed as set out in these other programmes. These are:
  - Integrate land-use and land transport planning;
  - Revise the Investment Decision-Making Framework to better recognise the long-term benefits of investing in resilience;
  - Develop an investment partner engagement strategy; and
  - Refresh local government relationship management.

The detail of these other programmes is set out in Appendix I.

- Responses that require further consideration but are outside the scope of this case (coloured dark blue in Figure 3). These responses have been developed to a strategic level and form part of the programme to be implemented under this business case. There would be a number of ways in which the intent of these options can be realised. This is not addressed in this case, but at a headline level are:
  - Incorporate long term planning for resilience between all land transport investment partners and key users;
  - Develop rapid assessment mechanisms to more readily enable resilience responses to urgent issues (emergencies);
  - Work with investment partners to develop community engagement strategies; and
  - Develop land transport resilience strategies - to address priority risks. This is discussed further below.
- Deliverables from this case (coloured in green in Figure 3).
  - Develop an agreed evidence base – for evaluating resilience related risks; and
  - Implement a risk prioritisation methodology and decision-making framework which would provide:
    - A standard approach to assessing and prioritising resilience related risks and developing appropriate solutions; and
    - A preliminary list of prioritised risks developed using the evidence base and standard approach.

As the key outputs of this case, these responses have been developed to a much more granular level of detail as part of this case. Building on these responses and with support from other team members, next steps would include activity to:

- establish a process to ensure that this evidence base is periodically updated, maintained, promoted, and linked to other related data-bases;
- support the use of the agreed evidence base and risk prioritisation methodology in investment decision making including using the IDMF;
- ensure projects supporting the agreed risk treatments are prioritised for incorporation into the NLTP (or RLTP) and deliver a response to the risk; and
- where feasible, utilise existing spatial planning exercises, capital improvement projects, business cases, and maintenance programmes to resolve resilience issues.

Other responses raised through the regional workshops not included in the preferred programme to be implemented under this business case due to scope include:

- Providing a funding model that allows for consideration of investments in non-transport infrastructure solutions to address resilience related risks where these interventions may be more appropriate than a traditional infrastructure solution;
- Establishing a resilience fund which would be specifically made available for investments in existing or new transport infrastructure that specifically address resilience risks, as a means of

transitioning to a more resilient future land transport system (e.g. specifically address impacts of sea level rise in the near to medium term).

While these could address issues raised in the workshops they were excluded because they require significant additional investment but are not anticipated to deliver additional benefits in a similar proportion.

Changing funding models for key transport system investors to explicitly allow for supporting non transport related activities would require a change to the existing statutory framework. This would require supporting analysis, developing a detailed proposal, appropriate consultation and formal adoption of the amended framework.

Establishing a resilience fund would provide funding for addressing resilience issues where there are no other drivers for change at a specific location. Many resilience related issues for the transport system occur in parts of the system where there are other reasons for investing in change, for example to improve efficiency or to address safety issues. This means a dedicated resilience fund would address the remaining risks that are not prioritised through the use of the appropriate investment decision making framework.

## Prioritised risks

The prioritised geographic risks are those that have both a high likelihood of occurring and will result in significant consequence if they do occur. The analysis of geographic risks considers current and future hazards, the vulnerability of transport systems to these risks and the criticality of the system. Key data sets used included existing natural hazards data, network asset information and the One Network Road Classification (ONRC) system. The risks implied by the datasets was discussed and validated with transport system managers in each region.

A summary of the extreme and major-risk sites from the prioritised list is included in Appendix F. Given the transient nature of some natural hazards (e.g. landslides) new information becoming available and progress being made through improvements and interventions, this list is likely to change over time. The focus has been on those areas that are not currently addressed through existing investment plans. This programme takes a long-term view of 70 years to reflect changing hazards due to climate change.

Appendix F of this case provides a summary of the extreme and major risks identified through the preliminary analysis and Regional Workshops. For each risk identified consideration has been given to both the approach to develop a response and options for responding, referencing ISO 14090 '*Adaptation to climate change — Principles, requirements and guidelines*'. Action to address these risks would take a variety of forms. Timing would vary and include addressing some risks immediately, developing concept solutions that can be implemented if there is a need to restore transport connections and / or scheduling medium to long-term implementation of solutions for risks that are forecast to emerge or evolve.

It is important that a range of responses are considered for priority risks rather than assuming that infrastructure would be maintained or upgraded to mitigate risk. Types of options for responding can be grouped as:

- **Defend** – develop solutions to mitigate the risk of disruption, for example flood protection or slope stabilisation;
- **Accommodate** – plan for periodic disruption, for example providing for rapid reinstatement, detour routes and/or timely information; and
- **Retreat** – re-route journeys away from the impacted corridor.

The risks have been grouped by region with preliminary development to address priority risks drawing on the timing and response options noted above. The risks have been grouped on a regional basis but could also be put together using a corridor or journey view. This is enabled by identifying and prioritising individual risks on a location basis across the country to develop a national dataset that can be filtered in multiple ways.

Responses would consider individual risks, but more importantly should look at combined risk on a regional, corridor or journey basis. The response projects would:

- Make use of the risk prioritisation approach;

- Sit within a framework including the updated Investment Decision Making Framework, future versions of Arataki and enhanced strategic land use planning and evolving operational processes/methods to address both immediate and future risks;
- Identify where business cases are required e.g. for responses to address extreme and major risks;
- Provide concepts or example designs to enable emergency response activities to deliver improved resilience; and
- Be reflected in Corridor Management Plans, Emergency Response Plans and future versions of Arataki (regional summaries).
- Provide an integrated, long term view on activities required to improve the resilience of the land transport system on a regional, corridor or journey basis.